

DRAGON USER

International edition

The independent Dragon magazine

75p US\$2.25 October 1984

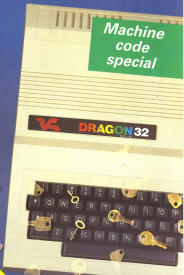
*Function keys
to unlock
your Dragon*

*Touchmaster —
the inside
story*

**Machine
code
special**

 **DRAGON 32**

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ZAKSSON

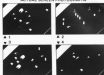
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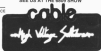
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How to submit articles

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 dis-
coveries 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 user of us who uses a Dragon will be
able to discover these tricks and goodies almost
every day. To help other Dragon users keep up
with the speed of the development each
of us must assume that we make 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
2000 words long. All submissions should be
typed. Please leave wide margins and a
double space between each line. Programs
should, wherever possible, be computer
printed on plain white paper and be accom-
panied by a tape of the program.

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

Contents



Letters

Including this month information on free
enrolment to the Cuthbert Club run by
Microdeal and bad news for readers want-
ing to make music by linking their Dragons
to a synthesiser

News

Confirmation of Dragon Data's fate brings
the news that Sunburst is to continue with
the manufacture of the 32, 64, Dragon
Professional and an MSX machine

Touchmaster profile

Gordon Ross travelled to Port Talbot to
meet an On-Dragon Data managing director
Brian Moore, now looking after the in-
terests of new firm, Touchmaster

Run with ROM

John Scovien reviews Bug Zapper from
Wideworld Microsystems — an aid to in-
stall program running

An educated review

Mike Harrison takes a look at what's
available in educational software for the
Dragon

Cave bird

Steve Galtwater's program of the month
will set your wings flapping

Machine code special

A special machine code pullout section
beginning with a short introduction to the
terminology and a review of two machine
code aids by Keith and Steven Brain

5 Sounding off

An extract from Keith and Steven Brain's
Advanced Sound and Graphics for the
Dragon 32 helps you to program in
machine code

Space shot

Michael Turner uses the Dream Editor
Assembler to convert his Basic program
listing into machine code

Functional features

Peter Whitaker's collection of utility pro-
grams enables the creation of special func-
tions by use of the Dragon's RTS sub-
routines called whenever a ROM routine is
used (Cover photo by Graham Tucker)

Incentive offer

Save £1.50 on incentive's latest game for
the Dragon and enter the win-a-disk-drive
competition

Open file

A keyboard routine, a wriggling snake and a
three dimensional robot are amongst this
month's selection of readers' programs

Adventure Trail

Help is at hand for adventurers stuck in
sticky situations. Mike Gerrard reviews
The Incredible Hulk and the first of the
Channel 4 Mysterious Adventure series,
The Golden Baton

Dragon Answers

Skidding around the page Brian Gadge
brakes in a bid with a dragon answer

Competition Corner

2000 of Salamander Software is the prize
to Gordon Lee's grid puzzler

Editorial

SOFTWARE IS THE key to success for any home micro. The nature, quality, price and
availability of software is crucial to prospective purchasers, as companies such as
Computers, Jupiter Centab, Texas Instruments and Matel have found to their cost.

Dragon's recent problems stem, at least in part, from a failure to attract the sort of
software written for the Commodore 64 and the Sinclair Spectrum. Dragon's software
was certainly available in quantity, but there were few games which captured the
imagination in quite the same way as Mario Miner did for the Spectrum.

To be fair, some companies which specialised in Dragon software, notably
Salamander and Wintsoft, produced some excellent programs. But, they did it with little
help from Dragon Data, and they did not produce any blockbusters. Nobody would buy a
Dragon simply in order to play a particular game, as some people might be tempted to
purchase a Spectrum or Commodore 64.

Sinclair, while it has a rather ambivalent attitude towards third party software houses,
ensured the production of high quality programs through its links with Pison, Melbourn
House and others. Similarly, Commodore has brought out a vast range of interesting and
innovative software, though it remains a hardware driven company.

However, with Eurocard moving Dragon's manufacturing base to Spain, it looks as
though the supply of Dragon software is starting to dry up. Companies which specialise
in Dragon software are fast converting their games to run on other machines. While
some new games may appear over the next couple of months, the outlook after
Christmas is distinctly bleak.

If Eurocard, Touchmaster or GEC want Dragon to maintain its share of the UK market,
they will have to start producing some software soon. More importantly, they will have to
convince the software houses that it is still worth their while developing new programs.
As yet, they have not attempted to do so.

RETURN OF THE RING

THE KING
OF
CHINESE
CULTURE

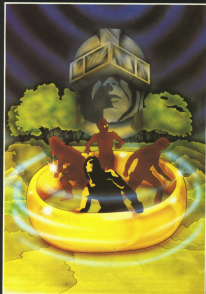
At least three surgeons
performed the study.

The destruction of Shredor is defeated, the Hall spawned hordes of the Decege lie at bay. Now Ringbecker, wielder of the Four-Bright Wings, must face the greatest challenge: to return the Ring Of Darkness to its creators on the hidden planet Ringworld... And somewhere at the ends of time the forces of evil are preparing their revenge.

After one year of development, Wintersoft are proud to present the most sophisticated game ever created for the Dragon 32. Written 100% in machine code, **RETURN OF THE BAHG** is an astounding multi program blend of superb high resolution colour graphics and advanced routines that allow you to communicate with your computer in complete sentences. You will face challenge and excitement as you and your Ringworld companions travel a mysterious planet and brave the dangers of an amazing three-dimensional forest moon. An epic adventure controlled for its wealth of detail and diversity.

Always handle animals properly.

Please note: RETURN OF THE KING is a complete adventure. You need not buy THE KING OF CASTLES to play it.



Abstract

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Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters
Page, Dragon User, 12-13 Little Newport Street, London WC2N 8LD.

Music, give me . . .

COULD you tell me if there are any firms selling an A to D converter for the Dragon 32 as I am interested in adding a musical keyboard to my computer?

*W Webb
Reading
East Sussex*

. . . music

I HAVE a small synthesizer that can be controlled by an external control voltage.

Is it possible to connect this with the Dragon 32 so that the computer will play the synthesiser? If so, how would I go about connecting the two together, and would I have to write software specially for this purpose?

*J A Gill
Brentwood
Essex*

WE DON'T know of any suitable interfaces which would produce the 1 volt per octave signal required to control most synthesisers. Even if you could find one you would have to write your own software.

Unfortunately, the Dragon seems to have been passed over in the field of synthesiser control in favour of bigger-selling American computers (no names mentioned) which now have several interfaces available using the new MIDI music control protocols, or digital to analogue systems.

Routine expression

I Think the following line-line abbreviation may be of interest to Dragon users, since it allows you to INPUT a simple expression, not just numbers.

Take the case where you are inputting a list of numbers (prices for instance) and you come to: 17 (miles at £37.50 each). You either have to put your calculator out, or use INPUT & V which means typing in address "one comma two", and "one comma two" for all the single items.

This suboutine inputs either a single value or two values with a multiplier. The multiplier can be * or / as you like, and the numbers can be any valid Basic

token, for example: 2000-5.00 (using X means a shift). In the listing, \$ = dollar.

```
1000 SUPERSTINE INPUT
WITH "X" OPTION
1010 INPUT "CAN USE 'X'":
IS
1020 C=INPUT(1,IS,"X")
1030 IF 2=C THEN R=NAL (3):
RETURN
1040 ZL=VAL (LIFT$ (R,
2-1))
1050 ZR=NAL (RIGHT$ (L,
4)-1)
1060 R=ZL*ZR
1070 RETURN
```

Example of use:

```
10 PRINT "ENTER COST":
20 GOSUB 1000
30 SUM=SUM+R
40 PRINT R,SUM
50 GOTO 10
```

One word of warning: if VAL feeds a non-numeric character, it gives up and returns the value 0, so without an error message.

*J R Latham
Bath*

Cuthbert club

TWO of the main Dragon User Groups, Games and Computers of Warrimann (who seem to have disappeared) and Dragon Dungeon (who are no longer trading) are now unable to provide the service previously available.

In the past many people have sent cash to user groups only to get little or nothing in return. We are prepared to offer a FREE (P) CUTHBERT membership to The Cuthbert Club, which is Monodest's own user group, to anyone wishing to join. . . all they need do is write to us for their free badge, quarterly magazine, hot sheets and so on. Our address is:

The Cuthbert Club, Monodest, 41
Truro Road, St. Austell, Cornwall
PL25 5JE

*John Symes
Monodest*

Not cricket

With regard to the review of Tim Lave's Cricket in the August edition of Dragon User, I'd like to point out that John Sorenson is incorrect in stating that the player is restricted to playing matches between England and a World XI.

As the several thousand Dragon owners who have already taken the opportunity to remark rhapsody on the West Indies will know, games can be held between clubs of the player's choice. In fact, one of the very attractive points of the game is that the save facility can be used to build a library of teams which can be matched against each other.

I think John may have been confused by the fact that if the player does not wish to take the time to name the teams and players, and give them batting and bowling ability points, the Dragon can be instructed to pick England and World XI.

*Patty Whitelaw
Paisley*

String data

IN THE July issue of Dragon User, Pam S Artz wrote in complaining that she had used DRPG(04) (double quotes) in a text file, but was unable to release the file as the quotes were interpreted at the start of a data field, rather than as characters in the field. Brian Cudge said that there is no simple

way around this, but there are in fact two fairly simple methods.

As Pam mentioned, there is no problem if single quotes are used, but if double quotes are needed then the file should be read using LINE INPUT $\#1$, instead of the more normal INPUT $\#1$ - 1, just as you would when reading such text from the keyboard. All the same rules apply for LINE INPUT $\#1$ as they do for LINE INPUT being used as normal.

*Matthew Halliwell
Shrewsbury
Staffordshire*

On the box

I, LIKE many other Dragon owners no doubt, waited eagerly for the transmission of Dragon software on the ITV computer programme. Sadly, unfortunately, I failed to record the programme and therefore missed the transmission.

If anybody did record the transmission, I'd be grateful if they contacted me at 0702 2578.

*Celia Towns
Plymouth*

ITT connector

SOME months ago I purchased an ITT Colour Tiltmonitor (model PL2310M) which is an extremely fine unit, giving an excellent picture. I could, of course, have purchased a unit without the monitor facility at quite a saving in price, but I opted for the monitor for the better resolution that it undoubtedly gives.

I have tried in vain since the purchase to obtain the necessary connector to get the sound and vision from the computer. I can get the latter, but no sound. Consequently I have been forced to use the TV channel, but whilst it is still a good picture I am not getting the best use from my additional outlay.

I have telephoned both Dragon Data, who referred me to the monitor manufacturer, and ITT who referred me to the computer manufacturer!

Can you, or any fellow-reader, help me in my plight?

*Gerald Woodward
Cheshire
Warringer*

Software Top 10

- | | | |
|---------|------------------------|-----------------|
| 1 (1-3) | Frederic | Beau Jolly |
| 2 (1-3) | Hammerhead | Ocean |
| 3 (16) | Hungry Horace | Melbourne House |
| 4 (70) | Burnard Bart | Monodest |
| 5 (25) | Cuthbert in Space | Monodest |
| 6 (45) | Dungeon Raid | Monodest |
| 7 (3) | Mr Dig | Monodest |
| 8 (1-) | Up Periscope | Beyond |
| 9 (1-) | Ring of Darkness | Watership |
| 10 (1-) | Cuthbert in the Jungle | Monodest |

Chart compiled by Watership Software

FACTS. FOLKS.

During the last few years we have produced or licenced lots of software for the 6809 microprocessor. Most of the software has been advertised or reviewed at one time or another, but never all together — there was too much to say about each product. This month we are giving the "blurb" a rest and just printing a list of most of the software available from Compuserge. If you want further details, write to us direct.

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Dragon 320 — Andrei Conest	4.80 = 0.80 ydy

*Tutorat individuel gratuit Du 15 au 17 novembre 2014

Morion (Square head)	4.31 inch (110 mm)
Dragon Head Cap	2.89 inch (74 mm)
Dragon pointer head	1.41 inch (36 mm)
Full size of all items	2.89 inch (74 mm)

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FLUORIDE Dose Response

FLEX is available on a number of hardware systems including the DRAGON and TANDY COLOR COMPUTER. All the software shown here is fully compatible with these systems. More to follow soon!

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Eurohard plans October launch

SPANISH firm Eurohard hopes to begin production of the Dragon this month at its plant in Cáceres, Spain. The company, which has bought Dragon Data's assets "stock, stock and barrel" according to ex-Dragon Data managing director Brian Moore, has the rights to the Dragon's plant, machinery and intellectual property (the right to new products).

The company is believed to have acquired the assets for £1 million. A team of Dragon Data employees are currently in Spain helping to set-up production facilities. Eurohard is a new company, privately owned, that has been set up to manufacture computers in a regional development area in Spain — it thus has many similar parallels to Dragon Data.

The company will start production of the 32 and 64 and is currently "finishing perfecting" the design of the Professional according to dealer Lopez the man in charge at Eurohard's plant in Spain. Eurohard also has the rights to Dragon Data's share in the GEC Dragon MBX machine



Production of the Dragon has moved to Spain

which it is also perfecting and will be manufacturing next year, although it is now thought that GEC has not yet signed a licensing arrangement with Microsoft.

The final deal that the receiver, Robert Ellis of accountants Touche Ross, set up is a tripartite arrangement that sees the production of the Dragon move to Spain, the marketing in the UK being taken on by GEC and the support of the Dragon being undertaken by Touchmaster — the UK company set up by ex-Dragon Data employees located at the Dragon plant in Port Talbot.

Eurohard, believed to be the first major manufacturer in Spain, had prior to the receiver being called in, actually signed a license with Dragon Data to manufacture the Dragon in Spain for the Spanish home market and Spanish speaking countries, including Central and South America. It now has the sole rights to manufacture the Dragon, which Touchmaster will be responsible for exporting initially to all territories other than Spain and Italy.

GEC has signed a distribution agreement to manufacture future Eurohard Dragon products in the UK through

GEC Radio and Television at Selkirk Park. GEC will also be responsible for selling off Dragon Data's stocks of the Dragon 32 and 64 in this country, though at press time the company had still not come to a deal with the receiver over the price it would have to pay for the stocks, and therefore couldn't comment on its plans to market the Dragon.

Touchmaster will be operating a telephone answering service and a Dragon mail order business at the Dragon Data plant in Port Talbot. The telephone number will remain the same — 0654 744780, though the address to write to has now changed. All enquiries should be directed to Touchmaster at PO Box 47, Port Talbot SA41 1ZG. The company will also be contacting software authors with a view to marketing products on behalf of Eurohard.

The manufacture and marketing of the Dragon in Spain will be supported by a television program to be run on Spanish television along the lines of the Computer program shown on BBC television in this country.

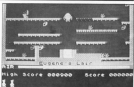
SEPARATE legal proceedings in the High Court were instituted both for and against Microdeal in London recently.

The American company Activision instituted proceedings against Microdeal on the grounds that Microdeal's *Coffbert in the Jungle* was a copy of Activision's game *Pell*. The company sought an injunction preventing Microdeal from selling *Coffbert in the Jungle*, and the proceedings were resolved when Microdeal gave an undertaking to the court that they would not make any further copies. Microdeal obtained a license to market the game from Rom Software in the US, but when it compared its license with Activision's it transpired that Activision had acquired a license first, and so Microdeal withdrew its license.

In other proceedings, Microdeal sought and gained an injunction against a Dr Monmouth, who it was alleged, in conjunction with his 14 year old brother, ran a tape copying operation from four different addresses in the Blackdown area. The tape piracy racket involved thousands of pounds worth of Dragon software being sold through classified advertisements in computer magazines. Games such as *Coffbert's Up* and Microdeal's *Frigger* and *Coffbert* were being copied on a large scale and offered to Dragon owners at a fraction of the retail price.

Court action

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Manc Miners, one of the most popular arcade-type games, in which you have to negotiate a series of intricate caverns, collecting treasures and avoiding mines, is on the way to the Dragon. The game (Spectrum version pictured above) is to be released by Software Projects for both the Dragon 32 and 64. The conversion contains most of the graphics and screens obtainable on other versions although it will be in black and white. Marie Meyer was responsible for spawning a whole new generation of similar styled games on the Spectrum. The game should be out by the end of September.

Dragon fair on the way

AT LONG last Dragon users will have a show of their own. The 6800 colour show will be held on Saturday and Sunday, 17 and 18 November at the Royal Horticultural Hall, Westminster.

The show promises to be a major event for Dragon owners, with a number of familiar names promising to be there. A Microdeal spokeswoman said that the company will have "a major position at the show" adding that it was going to be "the biggest thing for 6800 users since sliced bread."

Compuserp will be displaying Flex on the Dragon and according to Ted Oprea the show should be a "roaring success". Salamander promise to be there as do CelsiSoft and Peaksoft who will be holding a competition on their stand — there will be a prize to the top scoring batsman in Peaksoft's cricket game for the Dragon 32.

According to Mike Greenfield of Computer Marketplace, organisers of the event, Commodore Computers, Channel Software, Quikvision, Icon Computers, Microcare

MST Consultants, Trojan Products and Tandy have all booked places and many more companies have promised to be there.

The show will enable Dragon users starved of software and other products to see what is available for their money. Brian Mace of Teach-



Look out for Dragon User at the show. Mace said that GEO/Starboard or Touchmaster should be there. Sunshine Publications — publishers of this magazine, will also have a stand. For further details contact Mike Greenfield, Computer Marketplace, 30 Orange Street, London WC2H 9BB.

Imagine that!

FOLLOWING the news that Imagine had called in the official receiver, after failing to pay magazine publishers VNU £12,000 within a seven day

limit imposed by the High Court in London, Beau Jolly announced that it had acquired Imagine's existing stock.

The company, which was formed at the end of last year to seek licences to market products from a number of software companies, had in fact been distributing software for Imagine. It has now gained the rights to sell Imagine's stock and is offering Dragon users a Dragon Value pack for £14.99. The pack consists of four games for the Dragon — Arcadia, B. C. Bill, Cosmic Crusier and Leggit — all of which usually retail for £5.00 each.

For further details contact Beau Jolly at 18A New Broadway, Ealing, London W5.



Electronic software



JOHN MAGNUS is to be one of the first reselling groups to introduce the Electronic Distribution of Software (EDSOFT) system into its shops. The system, developed by Program Express, allows games, educational, home or business software to be transferred on demand to cassette, cartridge or disk at the time and point of sale. The machine that allows this (pictured above) gives users information on the "top 10" best selling software and can also present reviews on certain programs. All the popular names are catered for, including cassette for the Dragon.

Aids to learning

A NEW RANGE of educational software for the Dragon 32 and 64 is being launched by Abacus Software. Mike Madden of Abacus said that the company is pulling out of games software and concentrating on the business and educational fields.

Designed by teachers, the new range of programs are a revision series for GCSE 'O' level and CSE examinations. There are seven titles, covering Biology, Chemistry, Computer Studies, Geography, History, Maths and Physics. Each tape retails for £12.99 and consists of four programs.

There are nine tapes on each program plus a book which examines you on the previous nine. Graphics are also included.

For further details contact Abacus at 2n Union Street, Ramsgate, Nr Marg, Kent. Cash on the subject of educational software, says of a different sort — a full-scale withdrawal from the Dragon — comes from Colin Munn of Garland Computing, Garland, who planned to launch a range of software converted from its BBC programs (see Dragon User May) has decided to cut its losses and drop the Dragon altogether.

Bargain programs

DELTA80FT is hoping to sell a range of software at inexpensive prices for the Dragon 32. The first program is entitled Megamaze and retails for £2.50. Written in 100 per cent machine code this arcade-type game puts you in search of treasure. The screen scrolls either way as you remain in the centre of the maze looking for the hidden cache.

The program is accompanied by a utility (on the reverse side of the cassette) which is aimed at correcting the bug in the debounce routine of the Dragon's keyboard.

The utility (which is free with the game) enables the simultaneous pressing of keys — allowing very fast typing on the keyboard. Further games from DeltaSoft will depend on the response to the launch of these two titles. John Lange of DeltaSoft said the relatively inexpensive pricing policy is a result "of perennial complaints in the letters pages of computer magazines about software prices." Details from DeltaSoft at 48 Windsor Road, Croydon CR9 5DT.

Books are also selling inexpensive software — a range of titles for the Dragon and other micros are being sold at half price.

Touchmaster takes off

Gordon Ross looks at the new set-up at Dragon Data

AN EMPTY warehouse, a few framed pictures of old software covers and the Dragon logo at the receptionist's desk is all that remains of Dragon Data's presence at the former Industrial Estate in Margam, Port Talbot.

Dragon Data has now ceased to exist, or, strictly speaking, the company has been handed to the liquidator to pay-off the creditors. In its place is a complicated in-house arrangement designed to support Dragon users and continue with the production of the machines (see page 8 this issue). Central to this arrangement is the role of Touchmaster — a company set-up by ex-Dragon Data chiefs Brian Moore and Richard Wadman and occupying the old Dragon Data premises at Margam in Port Talbot.

Touchmaster is a new high technology company backed by Prutech, the investment arm of the Prudential Insurance group, and largely comprising ex-Dragon Data employees. Its role, as far as the Dragon is concerned, is an unusual one, coming somewhere between that of Eurohard and GDC: it will neither be manufacturing Dragons, nor maintaining them — its stocks having been shipped to Spain and to GDC's warehouses in Salford Park.

Sitting in a large conference room, Brian Moore, now managing director of Touchmaster UK, outlined the role of his new company, and was quick to point out that Touchmaster is not solely concerned with the Dragon.

Touchmaster has two purposes, a residual role — to continue to support the Dragon, and a new role as a development company. Touchmaster's support is linked to the roles of Eurohard SA — the company which will be manufacturing Dragons in Spain, and to GDC, who will be marketing Dragons in this country.

Initially Touchmaster will "assist with the move to Spain and help set up the production facility there". In this connection, a team of four Touchmaster employees are going to Spain to lend assistance to their Spanish counterparts. Brian envisages

spending some time there himself, but only on a temporary basis.

Once this initial stage has been completed, Touchmaster will "provide on-going support to Eurohard and will assist, where required, in any new product design." It will also be responsible for exporting Dragons to all territories other than Spain and Italy.

In the UK, Touchmaster "will assist the GDC marketing effort as required by GDC; and will sell Dragon software and provide support such as a telephone answering system, mail order business and so on. It has not been decided if Touchmaster will continue to service Dragons, though people who buy their Dragons from GDC will have them serviced by GDC. Brian said he hopes to continue to service existing Dragons, though Touchmaster may experience logistics problems such as obtaining spare parts and supplies.

There is lots of feeling for the Dragon at Touchmaster — a "labour of love" was how Brian described it — and a new mail order address has been set up to deal with Dragon orders.

A labour of love

Brian did not dwell on the reasons for Dragon Data's failure, as he was anxious to get on with discussing Touchmaster's future. However, he did admit that the Dragon 64 "was essentially late to the market. It is had arrived at the right time then it would have been more acceptable."

Brian, who was brought in to Dragon Data on secondment from GDC as part of a rescue package from the then ailing company, has learnt a lot from the troubles. He said the company experienced many problems operating in a young, relatively untested market and that it was inevitable that some companies would go — unfortunately Dragon was one of them. "Smaller companies either go out of the market or find a specialist niche" — which is where Touchmaster comes in to the scheme of things.

The Dragon side of Touchmaster's activ-

ities is secondary to its main purpose. Brian is keen to point out Touchmaster's main role: "The immediate priority is to make Touchmaster a successful company and to help Prutech bring new products into the market in the most effective manner possible."

Touchmaster hopes to do this by the launch of the Touchmaster pad at the PCW show in September. The pad — a touch-sensitive surface, designed, developed and manufactured in Britain, is being manufactured for all the popular home micros — the Commodore, Sinclair, BBC and the Dragon. Interphase are also on the way for the Amstrad and MSX.

Retaining at ECU8 the pad "provides a way of communicating with the micro other than through the keys". Brian believes that the pad will "change people's attitudes to software in particular" and lead to the opening of a whole new development in software, using overlays rather than the whole keyboard.

The pad comes complete with graphics package, interface and power pack for each micro. Touchmaster will sell software (staying at price from £5.99 to £20 and will be responsible for its own marketing. The company has the world licensing and sub-licensing rights for the manufacture of the pad, which was initiated by Information Entry Limited of Reading and is being produced engineered by Touchmaster.



The pad

The company is actively encouraging software companies to produce software for the pad. Touchmaster has about 90 games and utilities for the pad which Brian says is not a totally mass market product — rather, users will want it to complete their range of peripherals. As users change their micros they will be able to take the pad upmarket with them — all that is needed is a new interface.

Touchmaster is looking at other products which might not be for micros at all says Brian, who points to the need to diversify into other product areas. Brian, and most of the employees at Touchmaster, are putting all their energies into the pad. An extra 20 to 30 employees may be needed in the run up to Christmas. At present, Touchmaster has 35 employees and only a handful of these will be dealing with the Dragon side of the business.

Touchmaster's new mailing address for Dragon products is: Touchmaster, PO Box 47, Port Talbot SA13 12D. The telephone number will remain the same as Dragon Data's old one, namely: 0694-744706. A second Post Office Box number has been set up for trade enquiries concerning the Touchmaster pad and any new products the company may launch: Touchmaster Limited, PO Box 3, Port Talbot SA13 1PH. The telephone number for this side of the business is 0695-744773. ■



Once a thriving factory, Dragon Data's manufacturing plant now lies empty

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ALTHOUGH DISK systems are now available for the Dragon, and most users have come to terms with the cassette operating system, it's useful on occasions to be able to switch on and have a program up and running instantaneously. The only way to achieve this is to have your program held in ROM as an alternative to Basic on power-up. Dragons have a suitable interface in the cartridge slot on the side, but only a limited number of manufacturers have taken advantage of this fact.

If you peep inside a Dragon cartridge, you will see it contains one or two large chips in sockets. These are often a version of ROMs called EPROMs, (Erasable Programmable Read Only Memories) and they contain a machine code program. EPROMs are programmed by transferring a program byte by byte into the chip at the same time as subjecting each location in turn to a voltage of about 20v. Once the program is inside, it is remembered, even when the power is removed, and it can be treated as a ROM. (Many early versions of computers, such as the BBC and the One had their operating systems and Basic on EPROM.)

Erasable

With a ROM or PROM, you are stuck with the code written on it — sometimes called firmware, as it's between cash — and hard-wire — but the EPROM can be erased by shining a strong beam of ultraviolet light on to the chip, and it can then be re-programmed.

What the man in the street thinks of as a chip is of course simply the packaging, and the real chip hides inside. EPROMs have little windows on their upper surfaces, so that light can enter. Programmers usually stick a paper circle over the window to label the chip, and also to prevent ultra-violet light from entering. Although it's unlikely to happen, leaving an EPROM in bright sunlight for a long time could possibly erase your precious program.

Like all chips, EPROMs have identification numbers and these denote the memory size. For instance, one of the most common is the 2704 from Intel which has a memory size of 64K. This is 64K bits not 64K bytes, so in an 8-bit machine like the Dragon, you can store a 64 divided by 8, that is 8K program. The largest EPROM available at present is the 27256, which can store 32K bytes in one chip, as their price is something in excess of £100, they are out of reach of most programmers.

In order to "blow" or program your own EPROM, you need the necessary hardware including a socket for the chip, and you need the driving software to transfer your program and verify it.

Winchuk Micro Systems, manufacturers of the Basic editor/ assembler, have incorporated the hardware and software into a very neat package that plugs into the cartridge socket on the Dragon. A little larger than the normal cartridge, this is still fairly compact, measuring 18 x 10 x 2 cm, encased in hard black ABS plastic. On the upper surface are two LEDs, 14 colour-coded dip-switches and a 25P socket. (This

Run with ROM

John Scriven reviews Bug Zapper, an aid to instant program running

stands for Zero Insertion Force, and clamps the legs with tiny brass plates so you don't bend them.)

When switching on, there is no need to connect a separate power lead, as the unit is fed from the Dragon. Simply enter "EXEC 49152 and the start-up menu appears on the screen. The choices available are:

- 0) Fill buffer area with a hex character
- 1) Move data within the buffer
- 2) Examine/Change the buffer
- 3) Formatted dump in hex and ASCII
- 4) Checksum of buffer
- 5) Copy EPROM into buffer
- 6) Verify EPROM against buffer
- 7) Program EPROM from buffer
- 8) EPROM type selection menu
- 9) Save/Load (Cassette)
- 10) Return to Basic

A normal sequence of operations might be as follows:

- A) Write program using assembler.
- B) Debug and test program.
- C) Save program on cassette.
- D) Switch off and plug in EPROM programmer, switch on.
- E) Select menu option 8 and enter the type of chip you're using. The screen shows a picture of the dip-switches in their correct positions for that particular chip.
- F) Select option 9, save/load from cassette. This produces another menu that allows you to load the buffer with your program.
- G) Select option 3, a formatted dump, and take a print-out of the buffer's contents. This not only shows the hex contents in rows of eight, but also the ASCII equivalent of the code. Any led or key-words can be read from the screen.



Inside Winchuk's Bug Zapper

If everything is satisfactory, select option 7, insert a blank EPROM, and sit back. One of the LEDs lights up and the program is burned in.

One way to speed up entry is to use IPA (unfortunately this doesn't stand for India Pale Ale in this case, but INTELigent programming algorithm). Normally programming involves applying a 50 millisecond pulse to each location in the chip. In programming a 1K device, this means that pulses are applied for 1528 x 50 seconds, that is 51 seconds in all. As 8K device takes seven minutes to program, and so on.

Before programming, all the locations in an EPROM are set to hex FF, so it's possible to shorten programming time by skipping over any cell that needs to end up as FF. Intel also noted that the majority of cells don't actually need 50 milliseconds — 8 insures would do adequately, so they developed their INTELigent programming algorithm which carries in on this fact.

Supplied with programming pulses every millisecond, the location is checked against the data to see if it has "taken". If it hasn't, the pulse is repeated. If it has, the program moves on to the next location. This means a considerable saving in programming time: a 2704 takes seven minutes normally, and typically 1 min 15 secs using IPA.

Although there may appear to be a lot of menus and keyboard entry, the system is nearly foolproof, and most entries have sensible default values (if you don't call up the chip selection menu, the program assumes you're using a 2704). The programmer also checks to see if the EPROM is totally blank before you start and will detect suspect chips.

Verification

When you've finished programming, you can verify the contents of the new chip against the contents of the buffer by choosing option 8 from the main menu, in this operation, the contents are compared byte by byte and locations that do not agree are shown on the screen. If all is well, a check-sum is made and the EPROM can be removed when the LED goes out.

The documentation is enclosed in a 36-page spiral bound A4 folder and is easy to understand. It goes through each of the options in some detail, and technical notes are also available. The package is neatly presented and simple to use. It compares favourably with those on the market for other machines, and indeed is a lot easier to use than another firm's BBC reader I usually use.

As well as being an excellent development tool, the Bug Zapper provides one way of examining the contents of ROMs and EPROMs, even those designed for use with other computers. If you are using the Dragon for machine code development, then this would be a useful addition, even though it appears rather expensive at £79.95. If you don't yet have an assembler for your Dragon, then better value is provided by the version that includes the MACE assembler at £29.95. ■

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Educational enlightenment

Mike Harrison steps into the educational arena

WHenever small children play at "school" we know what to expect. The fantasy of dances caps and shoes being chased around the classroom by demoralised teacher-masters is far too powerful an image to be deflected by reality.

Kidly, helpful tale who go out of their way to care for and help their students to make the learning situation a successful and rewarding one never get a look in. This type of "school-fantasy" also often seems to infect the minds of programmers, putting together educational titles. Hence the host of "learning" programs we saw back in February when we last looked at educational programs available for the Dragon 32 (Dragon User, February). We saw quizzes galore in almost every guise (some with the wrong answers) and a collection of weak and inadequate packages which were more harmful in the pursuit of children's learning and understanding than of any help.

Fantasy

The idea that children should spend their time in school absorbing and failing to absorb meaningless dates and formulae has never been so firmly entrenched as now with the claim of the arts of information technology. The enquiring mind, the versatile child and investigative student are the concepts of education today. The contention that home-computers can make in this direction is tremendous — as long as we can keep away from fantasy-nightmares.

If we are then to avoid the worst of the misconceptions of how children learn and what they need to know, what is the best approach? Perhaps teachers and programmers might work together to produce fast, exciting and suitable material. This is the philosophy behind Ampacsoft's *Cheshire Cat Educational Series*.

Super Spy is an excellent example of what such co-operation can produce. It consists of four different programs each dealing with aspects of war-time Britain. Combining video-game skills and adventure-excitement in one game.

As a German spy you have to take in briefings on black-out Britain, its peoples, leaders and general activities in order to survive interrogation or parachuting into Scotland. Your luck depends also on your skill as a "thief", shocker and code-breaker and will affect your chances of delivering a secret message in 18 days, hidden across Britain. The package is very cleverly devised ensuring come-again motivation using all the hi-res colour and animation that the Dragon is capable of.

This also can be said for Ampacsoft's two **Maths revision** packages which contain a total of eight large programs full of the traditional subject matter studied for "O" level. Mixtures of text and graphics with worked examples and diagrams are shown on the PRMODE 4 screen.

In the worked-example parts the question is unravelled and the answers appear slowly on the lower half of the screen. This gives the user a sporting chance to have a stab at the method before all is revealed, compared to say a book where the brain needn't be engaged at all because the answer is there as you read.

Ampacsoft has not forgotten the younger child either. **Maths 1**, which was one of the better programs in my last review, has now a follow-up in **Maths Level 2** (page 8-7). They have pitched these exercises (79 in all) just right for the age group intended.



Facial features can be added ...



... and added



... and completed in Facemaker

Whereas many programs concentrate on testing based on the four rules of number without any rationale, Ampacsoft goes through "missing numbers", recording charts, simple place value and the concept of differences. At each stage help is given in a visually pleasing way if required and counting strips and abacus beads abound.

Dragon Data also has a series of tapes to teach young children various basic concepts. Written by Applied Systems Knowledge they continue the tradition established by the publication of the excellent **Hide and Seek** last year. **Teacher** sets the child the task of teaching his Dragon about the main features of the face of a friend or relative. Based on this information the computer selects from around a million different combinations of features to show a face on the screen.

You can experiment (give mum a battery and press your friend in a safety of headgear). The aim, of course, is not to make children into fashion experts or graphic artists but to make them observe, consider, judge the features of their friends — and most of all read and respond to the written word.

Lower case letters are drawn on the hi-res screen lining in with children's school reading experience and the program's contribution to understanding questions is valuable. "Are Mary's eyes small, large, smiling or mean?" The 6 to 8 year old's response will mean something to him in that as a direct consequence some eyes are drawn on the screen face. The accompanying booklet gives other educational spin-offs from the use of this great little program both at home and at school.

Impressive

Block the Badger is the star of **Shape-Up** a program for infants dealing with simple shapes — the square, circle, triangle and oblong. ASK have produced some brilliant graphics and their attention to detail is second to none. Mr Block has to help with some filling in a badgers' pond and each shape must be matched to its correct place.

Mr Block also plays basketball under the child's control (parking large and small objects) and meets a dispossessed magician who demands that the badger remembers a missing shape hidden in the box. Lastly the child has to help Mr Block build a house, train or rocket with large and small shapes and when completed the animated shapes bring the scene to life.

Many educational principles are included in this tape including the presenting of shapes to be matched at different angles so that true internalisation of the concept of a "square" has to take place before it can be recognised as matching a "diamond". This, along with the graphics and game-appeal, makes this program highly recommended for children from three years on.

The plethora of tables-testing programs around, most of which are based on:
10 A=PRMD 115; B=PRMD10;
20 PRINT A;"A-B=";"-INPUT 2
30 IF 2<0 GOTO 100
40 GOTO 200

with some news and gunstreams, made the way of Dragon Data's **Tables Adventure**. I needn't have been. It consists of four games each no harder than the last and using a variety of strategies to keep children's interest and get them to appreciate the qualities of numbers when combined together.

What do you find at the end of a rainbow? Well, a pot of gold of course, if you can make your puck bounce along the wall to hit the right target. The size of its bounce depends upon you hitting on the tables solution. Otherwise ASK has devised a mean little creature — halfway between Outback and Gollum who sneaks out and steals the gold away.

Number families is another game in this program and looks to the history of numbers before 60. You choose a number to score and the mini breaks out that number and all its factors (that is, if you choose 18 you score 18 but also lose 18, 9, 6, 3, 2 and 1). You can, however, only choose numbers which have a factor left so the game also involves investigation and strategy as well as knowledge of tables. The whole package resembles the way tables are tackled in school. It emphasises the relationships between numbers rather than the parrot-like responses of tables-chanting.

Shedding the rapids and underground adventure complete the task. All the games give variety to tables work and are just the sort of contribution to learning that home-computers should make.

Soft software has three impressive looking boxes: **Just-a-Mot** (French vocabulary), **Beesleged** (spelling) and **Word-power** (vocabulary and spelling) which takes us back to square one. If we take the French vocabulary package as an example — its philosophy seems to be that if you test long enough and hard enough learning takes place. Choices are available — you may be tested on people, travel, food and drink, shopping and essentials and the test may be games or a writing option.

The words you are tested on you cannot see beforehand; all of the action takes place on the test screen so no accounts can be written although the number of accents in a word is required to be known at higher levels.

Beesleged follows a similar pattern. Words are asked for (a definition is given)



The correct tables solution . . .



... brings you the pot of gold

but you have no chance to learn the words beforehand. Those mistakes in any word and you have to start the test over again. The package does not stand up to comparison with any Eurosoft's Talking Speller (Dragon User, February) and really makes no worthwhile contribution to educational programming.

Vocabulary

Wordpower claims to increase your vocabulary and contains over 1,200 words, including appositives, synonyms, nouns/adjectives, collectives and similes. The basic format is the same as Just-a-Mot with options for games or writing but without a chance to learn the information before a test nor to create your own test data.

Cablesoft's **Geography** is another in the series. "Quizzes you faster known and loved". What is the capital of Russia? A choice of five towns is given and if you are not Muscovian and therefore get it wrong the program will tell you. It will also ask you about currency too if you choose. I can't see why you should want to know about Meiser's capital for example, or the money

they use and what the purpose of a low-resolution map of the world and low-resolution of each of five continents is. However, the program does have one useful attribute — it will do a data search for you to find the capitals and currency of any country you name. Type in France, for example, and quick as a flash it will produce Paris. It can even cope with spelling errors. Looking some out eventually with the capital of Luxembourg is Luxembourg. Is this the country you mean? The thought strikes me that if we have the potential to come up with the capital Haiti in about two seconds fast why are we clogging up our minds with such garbage when machines will do it for us. Surely we should leave them free to be creative and do those things machines can't.

A more serious attempt to help children learn is the series of programs by Bensoft Educational Software. **Chemistry** comes with a book of 101 pages of concise revision notes, two sets of problems with randomised data, multiple choice questions with answers and a program giving advice on how to study and revise at home. The first program begins:

SO YOU THINK THIS WILL PASS YOUR CHEMISTRY EXAM FOR YOU. SORRY IT WILL NOT. WHAT IT WILL DO IS SHOW YOU WHAT YOU CAN DO TO HELP YOURSELF.

The important message is, of course, that there is no substitute for hard work.

Each of the sections loads a heavy text machine code file to mix text and graphics and produce those terrifying chemical formulae like K_2CrO_4 and Fe_2O_3 which would look nonsense on the test screen.

Physics is much the same. A useful revision book is provided and sections on mechanics, electricity, heat/pressure, light and sound are programmed. Twenty questions are used in each section and marks awarded for your efforts. When you have achieved 100 the authors consider your knowledge to be adequate in this area. Diagrams help where appropriate and there is a recap option at each stage.

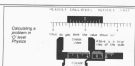
Physics involves a great deal of mathematical manipulations and any revision program must involve a high input of such problems. Two programs on the tape provide this and the unknown quantity is randomised providing practice in manipulating equations. I believe the authors



Notifying the points in Beesleged



Snell's Law explained in *Beesleged* (© Bensoft)



could have gone further still in that the actual quantities could be randomised. For example, the problem on Snell's Law asks for a refractive index D.A. If you are wrong, you're told the answer but unfortunately not how to find it. The second attempt at the question is identical to the first — a wasted opportunity. If the angles of refraction were randomised then a different question could result at each turn. This is especially easy in this particular question (Basic supports Sin 2) but I'm sure can be worked for them all.

Useful revision

On the whole, these science packages would be useful as part of a revision program for major examinations. The seriousness of the publishers is underlined in their caveat: "This package is intended to complement the work by the pupil in school. It is not intended to be a complete 'O' level course. Provided that it is used in conjunction with the normal course work it should provide added stimulus and assistance."

Three other Softest programs are not at quite the same quality. **Jungle Maths** and **Astronaths** set out with the aim of making practice at the 4 rules of number more palatable. Taken at this level I suppose the latter succeed. The child has to find his way through the jungle by answering maths drill type questions. A few resolution map charts his progress.

The exciting thing is what happens to you when you fail. Falling down a pit, being attacked by vampire bats, falling into a river (taking allowed response time) are mild by comparison to serious disasters. These are beautifully drawn on the four screens in four colours along with a howling you — he spits out your head and you get squeezed by a snake — all quite horrific.

Fractions and percentages are the key to Astronaths. "Galactic Pulvers" is the game you play and you are allowed a shot at Astron every two successful answers. There are options on difficulty and the test requires 10 per cent accuracy for you to advance your ship. I don't know what the poor Astronaths have done to deserve such treatment: perhaps they failed to achieve 10 per cent accuracy on their planet's equivalent test. For children of nine years and older the program might afford some amusing practice but I do find that the way tests have been handled is frustrating. I got the question 10=2.5 five times in a row on the easiest level of difficulty and 10:3=6.250 was repeated as not enough places of decimals had been written on the hardest level.

Star Reader starts off beautifully. A superb picture of a mountain scene begins the story, telling of a day in the mountains. Unfortunately the rest of the program doesn't quite match up to the beginning. The tale is text screen only and therefore in capitals and quite confusing to the young children who it's supposed to help.

"O' level Physics —
Measuring Instruments I
Measuring Instruments II
"O' level
Geography
First letters and words
ABC
Tell the time
Sixty-second
Music Tutor
ES-85
Geography
ES-85

Atmos Software
21 Union Street
Hemel Hempstead
Herts
Larvik

Free Maker
Shape-Up
Tables Adventure
£10.95 each

Super Spy
Computer Studies
Maths "O" level
part I
Maths "O" level
part II
Maths 2 (6/7)
(beginners)
Basic history
(beginners)

Cheshire Cat
Educational
Software
Amersham
21 Woodbridge
Road
Dunton Green
Buckingham
Gerrardsbury
Bucks

Just a Mail
Bridged
Wordmaster
£9.95 each

Gale Software
4 Church Street
Aldershot
Hants GU11 1JL

Quantify
Physics
£7.95 each
Jungle Maths
Astronaths
Star Reader
£9.95 each

Softest Educational
c/o Minister Computers
Newcombe
Barnstaple
North

A lot of thought has obviously gone into the close procedure sessions. The four programs which make up **Star Reader** are those often used in junior school projects. So except for the problem of their ease the program would be useful and is the sort of program, on say the BBC machine, much in demand in school.

Atmos software produces a range of educational material for a wide variety of ages. Its "O' level Physics measuring Instruments (one on length and one on volume) give some graphic demonstrations of the use of rules, verniers and micrometers, pipettes and burettes. Questions as to estimating these quantities also form part of the program.

"O' level Geography weather map symbols is rather dry. It consists of screen after screen of symbols for 7/8 cloud cover and wind directions. First letter and words is rather poor too. Labels are drawn on the screen either on command or in order. Quite what the value of interest in this is I've yet to discover. Its other infant peak, however, is probably the best of the bunch. ABC requires the user to test several items from quizzable to linker by hitting the first letter of their names. The illustrations are well drawn and clear and the pace and style suitable for the children it is designed to teach.

Music Tutor is fine. It is also one of the only few packages to come from Atmos with reasonable documentation. The program allows music to be written, displayed in note form, played and saved on tape as data. There are also four full files of demonstration tunes. It has one annoying feature to those of us susceptible to that speed-up poke. My Dragon kept leaping out of the program whenever I opted for the "Musicgen" option. If you can close the same little window line 4320 to read: F0RH = 1 T0LEN (H5) and this will cure it.

Language options

Tell the time is a quiz on getting the time right as shown on a clock face. The time you have to get is represented in the computer's memory as strings so be very particular how you answer. The program has French and German options and also contains a mistake. A time of 9.25 is drawn on the screen and the answer required is 9.50. If you intend to use it with children then insert Ctrl = "20 PAST 9" after the date search and re-save to be sure. By the time we came to struggle with it at six months to go and so on the mistake had been cured so obviously it had been discovered by the publishers. Odd that they didn't go back and correct the English version.

To sum up, although the educational software now available for the Dragon still consists of quizzes being produced under an educational flag of convenience, the tide is turning and quality programs contributing to children's thinking and learning are out and about. ■

Scramble, scramble!

Don't drop the eggs in Steve Gathercole's *Cave Bird* game

THE IDEA of the game is to fly the "flapping" bird to the other side of the cave and pick up an egg (the egg will not disappear as you pick it up but will reappear at the nest). Use the right joystick for left and right movement and the fire button for upward movement.

The game may sound easy, but the eggs are slowly sinking into the mud and you must not bump into stalactites or your egg will be smashed (if you have one) and you also stand the chance of being knocked out. The program makes use of the Dragon's GET and PUT commands and also the PPOINT function.

Draw strings have been used to provide text on the high resolution screen, in "computer-style" writing.

Variables

XX and YY Position of birds x and y
MY Mud level

BU Number of bumps
WS Print string
JO Joytick variable
XX and YY Position for letters strings

Array Notes

DL Bird left wing up
DR Bird right wing up
DS Bird in mud
BL Blank
LDL Bird left wing down
LDR Bird right wing down
BSL Bird sitting

Program Notes

10-100 Initialise
100-180 Draw display screen and introduction screen
200-430 Draw screen and sets start position
440-730 Main loop
740-770 Positions bird at start position
780-820 Routine for bird falling (left)

830-860 Routine for bird falling (right)
870-1080 Routine for falling into mud
1090-1160 Routine to say "Goodbye"
1170-1260 Routine for bird up or down (left)
1270-1400 Routine for bird knocked out
1410-1500 Check for eggs at start
1510-1610 Routine for bird up or down (right)
1620-1690 Routine for bird up and left
1700-1770 Routine for bird up and right
1780-1800 Routine to draw letters
1810-1820 Routine to draw score number
1830-1970 Initial screen
1980-2090 Instructions
2100-2140 Display wall sign
2150-2160 Read and set up graphics to point on to screen
2170-2180 Data for graphics
2190-2200 Get graphics into arrays
2210-2240 Read data for draw strings
2250-2310 Data for draw strings

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      1910 GOTO 1910
      1920 IF PPRG=100,000,000 THEN GOTO 1920
      1930 GOTO 1930
      1940 IF PPRG=100,000,000 THEN GOTO 1940
      1950 GOTO 1950
      1960 IF PPRG=100,000,000 THEN GOTO 1960
      1970 GOTO 1970
      1980 IF PPRG=100,000,000 THEN GOTO 1980
      1990 GOTO 1990

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Continued on
page 21

Salamander

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POSTAGE

FREE
POSTAGE

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Machine
code special

Getting to grips with machine code

Keith and Steven Brain simplify the jargon as they take a look at the S-22 Toolkit from Ashby Computers and Microtec's Ace Trace...

AS HOME computer users become more experienced they often feel that it is time they left the relatively safe haven afforded by Basic and begin to delve deeper into the box to get to grips with machine code programming.

A major problem for the novice who is looking for a machine code programming aid is that everything is steeped in jargon. There is not enough room here to explain all of this but to start with we will make a few simple definitions, which should make our comments later rather clearer.

Op-codes

A Machine Code Program consists of a series of memory locations containing numbers which represent specific instructions of the CPU. These numbers are known as op-codes. Although we normally use decimal (base 10) numbers the computer uses the more efficient hexadecimal (base 16) notation.

In this the letters A to F represent the digits 10 to 15, so that any number up to 255 can be indicated by two digits, which can be stored in a single byte. Unfortunately most people find it difficult to think in hexadecimal (perhaps because they run out of fingers).

A Machine Code Monitor allows you to directly examine and modify the contents of specific memory locations. A machine code program can be created in this way, by entering the appropriate op-codes, but unless you have the memory of an

elephant it is very tedious for anything other than very short programs.

As most of us are happier with words than numbers, each op-code can also be represented by a mnemonic, which gives a good indication of the action. For example, INCR A (+4C) increments the value in register A by one.

A Disassembler reads the contents of memory locations and translates the op-codes into mnemonics.

A Machine Code Editor allows you to construct a text file using mnemonics (rather like a Basic program) which you can easily modify during program development. This text file is known as the source code and it cannot be executed directly.



An Assembler translates the source code into object code, which is the final machine code routine. This is very compact, but difficult to edit.

A Trace program allows you to run your program in slow motion, with disassembly and/or display of the contents of each CPU register at each step.

Although a number of machine code programming tools have been available for the Dragon for some time, two new products have recently entered the arena. The S-22 Microcomputer Systems Toolkit consists of a small cartridge and extensive manual in what can only be described as an enormous cardboard box, whilst Microtec Software's Dragon Ace Trace comes on cassette, together with a slimmer manual, in a 'video box'.

The S-22 Toolkit is extremely well-

suited into a small cartridge. Unfortunately, it is rather difficult to slide into the Dragon cartridge port, as to line up the PCB with the internal edge connector you must leave about 3mm of fresh air under the lower edge of the box! (Extensive fumbling and cursing soon gave way to standing the Dragon on its side for insertion.)

The manual is in two parts, extending to over one hundred pages, but we found that it did not live up to its promise of being "easy to understand". Undoubtedly the coverage is comprehensive but the style is a strange mixture of Latin with Mother, Advanced Computer Science, Successful Salesmanship and a political manifesto, in which the thread somehow seems to get lost on the way.

Wrises

For example, on page 3 the author states "I will now take a pause as you read the programming manual for the 68000, and a book on machine code programming, if you return still in one piece and sane, I will continue to introduce S-22 to your machine". However, regrettably, he makes no suggestions on what to read, but instead continues to extol the virtues of the product at great length ("It's a workhorse and will probably never be far from your

```

M>P
ACE TRACE
M>E
ECL1
00001 #SCREEN INVERT
00002 DRG #7000
00003 LD1 #0400
00004 LOOP LDW ,X
00005 EDRA #40
00006 STA ,X+
00007 CMFA #0600
00008 BLD LOOP
00009 RTS

```

Example of Ace Trace source file.

```

EX
7000 0E L LD1 #0400
7003 46 L LDR #04X
7005 66 L EDRA #40
7007 67 L STA X+
7009 6C L CMFA #0600
700C 25 L BCS #+F5 7003
700E 39 L RTS

```

Example of S-22 disassembly

RDP ACE TRACE

Example of disassembly
and register using "Trace"
facility of Ace Trace

```
RPT  
START ADDR: 8000  
A-B-D-X---Y---U---SP---EPHIN2VC  
003400FF0000000000002FF
```

```
8000 7E B840 JMP B8B40  
A-B-D-X---Y---U---SP---EPHIN2VC  
003400FF0000000000002FF
```

```
8B40 CC 0034 LDB E#0034  
A-B-D-X---Y---U---SP---EPHIN2VC  
003400FF0000000000002FF
```

```
8B43 8E FF00 LDR E#FF00  
A-B-D-X---Y---U---SP---EPHIN2VC
```

```
32  
WRITE TO "BASIC" ? Y  
START HEX:7000  
ENDING HEX:700F  
TITLE ?SCREEN INVERT  
HG :
```

An example of the use of the S-22 "write" command

```
10 REM S-22 DATA:SCREEN INVERT  
20 DATA 142,4,0,166,132,136  
30 DATA 64,167,126,140,6,0  
40 DATA 37,245,57
```

4 meter" — "that will serve you in years to come".

On major difference between S-22 and many other machine code tools for the Dragon is that it does not contain an assembler. The manual explains memorials but then goes on to claim that "symbolic assembly is more associated with 'development machines' where very large programs needing mass disk storage are entered".

Assemblers

Of course learning all the op-codes by heart is undoubtedly good for the soul, but many excellent small system assemblers are available which make life so much easier for the machine code programmer.

S-22 is independent of Basic having its own input/output routines with autoseal and diversion to the printer port available. Commands are entered by single key presses and a high degree of nesting is supported. A logical memory address system is used which saves a lot of unnecessary typing, and memory locations can be named (as for labels in an assembler).

A major feature claimed for S-22 is the tracing facility included which allows you to step through your machine code program examining register contents at each point. Breakpoints are set by automatically inserting the software interrupt op-code (IOPR) at appropriate points so that only routines resident in RAM can be traced. A disassembler is included and blocks of memory are easily relocated.

One interesting feature is the WRITE command which instantaneously transforms the contents of a series of defined memory locations into Basic data statements. This makes inclusion of machine code subroutines into Basic programs very straightforward.

Many internal S-22 routines are documented but of course these are only available with the cartridge in place — and you are warned against copying them! Some example programs are included, together with "pseudo data" (7) sheets on the 8085, 8088 SAA chip, and 6847 video display generator, together with some incomplete information on standard Dragon routines.

Our overall feelings are that, although it contains some novel features, the lack of an assembler (despite the price tag of £28.95), and the confused documentation makes this a rather unattractive package.

Ace Trace contains 9,254 of code which normally starts at \$F000 (that is, the first graphics page) but since it was written in position independent code it can be located anywhere in memory between \$F000 and \$F6800 on the Dragon 32 (or even higher on the Dragon 64), providing considerable flexibility. This does, however, restrict the amount of memory available

your source file which can then be assembled to memory. FCB, FGC, FCB, OFD, and FMB directives, decimal, hex and binary number bases, addition, subtraction, ASCII characters and labels are all supported, and the line editor is easier to use than the Microsoft Basic version. Lines can be renumbered, so that it is easy to insert additional material.

The assembler is of the two-pass type and plain English error messages indicating the defective line are produced. Source code can be saved and loaded within the editor/assembler, and object code with the normal COMAVM CLOADM commands.

The Trace facility is very unusual and interesting as it runs in real time (at 1,580 speed) and allows tracing in both RAM and ROM. At each step disassembly and/or a register dump can be displayed, without setting breakpoints, and tracing can be stopped and started by pressing the space bar at any point.

Appealing

Although it does not have all the features of some other "all singing — all dancing" assemblers (for example, assembly direct to tape or disk) the Trace facility is a plus point and this is a very competitive product which should appeal to the novice. It is perhaps unkind to say that one of the most attractive features of Ace Trace to many users must be the price, but at only £14.95 it undercuts most of the opposition by a mile, which leaves you with more than enough spare cash to buy some decent books on machine code programming. This must be a winner. ■

Dragon Ace Trace
Microbits Computer Systems Ltd
35 Uplands Road
Dunwich
London EC20
Price £14.95

S-22 (UK Sole Distributor)
Ardor Computer Centre
207, Aisle High Street
Southwark
South Merton
Price £28.95



for your programs, although this is unlikely to be of practical significance for most users.

If you leave Ace Trace in its default location on the graphics page it will almost survive a system reset and Basic will start (only six documented bytes need to be re-entered). The screen display is rather unusual in that green characters are produced on a black background. This is claimed to minimise eye strain, and made it obvious when you switched back and forth to Basic.

The manual is much briefer than the S-22 version, but gives a well-presented introduction to the system with some example programs. The register provided a standard set of memory examine and modify commands, together with (SOPH) of blocks of memory. Worthy of two blocks of memory, Disassembly and Register display.

The Editor provides a comprehensive range of two-letter commands to construct

Sounding off

... and show how to use machine code subroutines in Basic programs with an excerpt from their book *Advanced Sound and Graphics for the Dragon*

MACHINE CODE is the ultimate language of the microprocessor and even if you do not go to the extreme of writing programs entirely in machine code you can use subroutines written in it to improve your programs. We cannot even attempt to go into the details of 6809 code here, as that would take at least one whole book on its own (if you think that Basic is complicated then you will soon realise that machine code is rather like ancient Sumerian hieroglyphics by comparison).

We will therefore just explain how you can use machine code subroutines in your Basic programs, and give a few examples of sound and graphics routines. All data is given in hexadecimal base. That may make things look even more complicated but if you want to get into machine code you are going to have to get used to it sometimes, so you might as well start now!

CLEARing space

First you need to reserve room in memory to store the machine code you wish to write so that it cannot be obliterated by Basic programs or variables. This is done with the CLEAR command, which is also used to reserve string space for Basic programs. To reserve space for machine code a optional parameter must be added, which limits the highest address that Basic can use. Thus:

```
10 CLEAR 200
reserves 200 bytes for strings and
10 CLEAR 200,$H000
reserves 200 bytes for strings and the area
above address $H000 for machine code
routines.
```

If you are going to do much work with machine code then you should invest in an editor/assembler but in the meantime this little program will allow you to enter code quite painlessly. There is no need to type "H" to indicate hexadecimal numbers as this is added automatically. (Assembler listings are also included for the fortunate.)

```
1000 CLS:PRINT "START ADDRESS" :
INPUT ST:ST=VAL("H"+ST)
1010 PRINT "START ENTERING DATA"
1020 PRINT HEX$(ST):INPUT A$
```

advanced sound & graphics for the Dragon computer

including machine code subroutines

Keith & Steven Boon



```
1030 POKE ST,VAL("H"+A$)
1040 ST=ST+1
1050 GOTO 1030
```

One major difficulty with machine code is that there are no error-trapping routines built in, so if you make a mistake entering the data the whole thing can quite easily crash.

Sound is turned on by loading a byte to address \$HFF23, and the tone sounded depends on the value loaded into \$HFF23. The duration depends on a time delay which you build into the program. This simple routine just makes a single sound. When you have entered the numbers in the second column of listing 1 from address \$H000 with the loader program above you call it by EXECuting from the start address.

You should be able to define up to 10 separate machine code routines on the Dragon within the USA n function but, due to a bug in the ROM, USA 0 is always called no matter what number you specify. Where no parameter need to be passed to

the routine this causes no problem, as you can simply EXECute the starting address of the routine to call it.

```
100 EXEC$H000
```

If you RUN this Basic program it will make a single sound and then report back with OK. If you add 30 GOTO 20 it will repeat until you press BREAK.

Where you need to be able to pass parameters to a machine code routine the simplest thing is to EXECute it after POKE values into it. The tone value used is stored at address \$H0008, and the duration as a two byte number of addresses \$H0008 and \$H0007, so try experimenting by POKEing in different values. For example:

```
20 POKE $H0007,$HAF
```

If you see too many to think of values then try:

```
20 POKE $H0007,RND($HFF)
```

although we warn you that it will sound a lot like noise!

If you add

```
20 POKE $H0008,RND($HFF)
```

it will sound a little more like the orchestra tuning up.

Saving routines

The area of memory reserved for machine code is not saved by a normal Basic program SAVE so you must SAVECOM and take into account the address and length of the program. For example this first routine can be saved by:

```
SAVECOM "sound", $H0000,$H0008,$H14
```

Machine code allows you to make interesting sounds as these can change tone very rapidly. For example the listing in program 2 produces a "phaser" type sound. It is entered from \$H100.

The Basic routine below calls it whenever a key is pressed, but POKEs different values into it according to whether A or B is pressed to produce two different sounds.

```
20 IF PRP$(C0)=246 THEN GOTO ELSE
1=PEEK(130)
20 IF =55 THEN POKE$H0007,$F CL
20 IF =55 THEN POKE$H0007,$F CL
20
40 EXEC$H100
```

```
DISASSEMBLE FROM=$000 TO=$015
$000 86 3F LDA #3F
$002 87 FF 23 STA $FF23
$005 8E 00 FF LDX #00FF
$008 C6 5F LDB #5F
$00A F7 FF 20 STB $FF20
$00D 5C INCB
$00E 26 FA BNE $00A
$010 30 1F LDYX -1,X
$012 26 F4 BNE $008
$014 39 RTS
```

Listing 1

```
DISASSEMBLE FROM=$100 TO=$113
$100 86 3F LDA #3F
$102 87 FF 23 STA $FF23
$105 1F 00 TFR A,B
$107 F7 FF 20 STB $FF20
$10A 5C INCB
$10B 26 FA BNE $107
$10D 4C INCA
$10E 2A 01 BPL $111
$110 4F CLRA
$112 20 F2 BRA $105
```

Listing 2

```

DISASSEMBLE FROM=6200 TO=6223
6200 85 3F      LDA    #3F
6202 87 FF 23    STA    $FF23
6205 10 8E 62 50  LDY    #6250
6209 0E 00 00    LDX    #0000
620C 05 40      LDB    ,Y+
620E C1 00      CMPB   #00
6210 27 13      BEQ    6225
6212 1F 98      TFR    B,R
6214 F7 FF 20    STB    $FF20
6217 3C          INCB
6218 26 F8      RNE    6214
621A 1F 09      TFR    R,B
621C 30 1F      LDRX   -1,X
621E 26 F4      RNE    6214
6220 20 07      BRR    6209
6222 39          RTS

```

Listing 3

50. GOTO 30

It is often useful to be able to set up a sequence of tones to be played, and these are best organized in a "sound table" in memory. The program in listing 3 starts from \$H6250 and reads tone bytes from listing 4 which starts at \$H6250 and continues to sound tones in sequence until it finds a zero.

Use the loader program to enter some values into this table and listen to the effect (you will have all the space up to \$H64FF available). To speed things up, POKE a smaller value into \$H6205.

start and end address values in \$H6501/\$H6502 and \$H650A/\$H650B, respectively. For example if you POKE \$H650A with \$H05 then only the top half of the screen will invert.

The routine in listing 4 allows you to fill certain bytes of the hi-res graphics screen with any number. The main use is in clearing parts of the screen or setting up a particular pattern. The routine places the values in \$H6501 and \$H6502 into consecutive bytes of the screen. This is particularly fast as it is done in one movement by testing the B bit of A and B

```

SOUND TABLE DISASSEMBLE FROM=6250 TO=626F
LH          6250 8E 04 00    LDY    #0400
---         6253 85 04      LDA    ,X
          6255 05 40      DORA   #40
          6257 07 00      STA    ,Y+
          6259 0C 05 00    CMPX   #0500
          625C 25 F5      BCS    6263
          625E 39          RTS

```

Listing 4 (above) and 4 (below)

```

SOUND TABLE DISASSEMBLE FROM=6600 TO=660F
LH          6600 8E 00      LDY    #00
          6603 85 00      LDA    #00
          6605 05 05      LDB    #05
          6607 06 00 00    LDX    #0500
          660A 27 13      STB    ,Y+
          660C 1F 9F      CMPX   #17FF
          660F 20 07      BCS    6607
          660E 39          RTS

```

Normal and inverted characters on the text screen can easily be inter-converted with the listing in program 5 which makes an EOR (exclusive OR) of each character on the text screen with \$H40. The Basic program below will invert the screen every time a key is pressed thus alternating between the two forms:

```

20: G=INKEY$ IF G="" THEN GOTO
30: EOR$=H40
40: GOTO 30

```

No doubt you will be impressed by the speed of this routine which is virtually instantaneous. If you want to invert only part of the screen change the two byte

registers as a single 16 bit D register.

The start address of the area to be filled is at \$H6505-\$H6506 and the end address at \$H650A/\$H650B:

```

20: POKE 5,1 SCREEN 1:3
30: D=DEC$+H405
40: GOTO 40

```

If zeros are POKE'd into \$H6501 and \$H6502 the top three-quarters of the screen will be cleared as for POLS, and if \$0FF is POKE'd with zero and \$H6502 with \$0FF the result is red and green stripes. Experiment with other values remembering that each screen point is controlled by a pair of bits in POKE'd 3. ■

A spe age

Michael Turner explores the intricacies of machine code.

FOR A long time I have found Basic very slow. Although it may be quick and easy to work in Basic for the production of an original program, the running speed of a Basic program leaves much to be desired.

Even my change from the Sinclair ZX81 to the Dragon, did little to satisfy my ambition in this respect, despite the 400 per cent improvement in operating speed. (Experiments using both machines in fast mode showed that the Sinclair took 10 seconds to run a program compared with four seconds for the same program on the Dragon.)

Whenever action is required within the graphics of a games program, it is this slow operating speed that produces the greatest degradation to the CRT programmer. In one of my efforts, called "Space Shoot", the action of the laser gun was especially irritating. It started an age before the shot from base reached the top of the screen. Not at all the high-speed, space action adventure I intended.

Fading hopes

The only answer was to master the intricacies of programming in machine code. Despite a year of searching through libraries and bookshops, I failed to identify and locate a suitable publication. All the books available seemed, to me, too difficult for the beginner. It must be remembered that machine code, like Basic, is machine specific. Books on machine code for the Dragon were not readily available and those for the Tandy, a machine which shares some features with the Dragon, are of limited value because of the differences in machine code application.

Just as hope was beginning to fade, I acquired a copy of the "Dragon" Editor/Assembler.

**EDITOR
ASSEMBLER**
**EDITOR
ASSEMBLER**

— a program/cassette previously marketed by Dragon Data and now available by mail order from it's author Mike Kemp of Grosvenor Software, 22 Grosvenor Road, Bedford, East Sussex. Even with this powerful new tool, the struggle was not over. It took some time to understand what I was doing with the

Speedy space-

re solution

...how the Dream Editor/Assembler helped him to master
code, allowing the conversion of his Space shot program from Basic

package and to apply this new knowledge to the programs I wished to write.

The main difficulty is that the booklet supporting the Dream cassette assumes previous knowledge and experience of writing machine code. Consequently, as a total beginner some areas of trial and error (or should I say trial and crash) were necessary before I developed any understanding of the operating procedures.

Back to front

Although I began in the logical way — working through the book from the beginning and entering into my machine each of the examples, it was difficult to get to grips with what the documentation was saying. I decided to reverse the process. This time, I started the book at the back by entering in the demonstration programs and then consulting the dictionary of terms to discover what each line meant. This process is far more rewarding. Through a process of substitution of values, I began to understand what the package was intended to achieve.

My first hesitant, independent ventures (still with the booklet firmly clutched in my left hand) moved the test display one character space to the left. I prepared the program in object code as shown below:

```
LDX #0001
LDY #50400
LDA X+
STA Y+
CMPO #0000
BCD $4030
JMP $4020
RTS
```

The Dream Editor/Assembler converts these values into machine code form (that is, strings of numbers buried within the memory of the computer). My curiosity made me anxious to see this conversion, which had been achieved by the assembler, displayed on the screen. A Basic routine allowed me to do this.

I remember well the feeling of quiet satisfaction as the screen began to fill with numbers and I knew that I had achieved my first objective. Having noted the values from the screen, I cleared the memory of the machine and poked in the program listing, starting at memory location 20001:

57

With the program re-entered, I used EXEC 20001 to get it to run. (I could have used DEF USR = 20001: A = USR 000) to achieve the same result.)

To understand the program when using the Editor/Assembler, it may be examined in its object code form. For example, in the first two terms in the program quoted above "LD" represents the load instruction while "X" and "Y" are the index registers doing the same job as the first part of a poke statement. The next term LDA,X+ loads into the Accumulator "A" the value in memory location "X" and then increases "X" by one.



The All Dream package contains the Dream Editor/Assembler and a monitor/Deassembler for use with Dream

STA,Y+ stores the value in Accumulator "A" at memory location "Y" and then increases "Y" by one. In the next line "BCD" is compared with #0000 which is the last position in the screen memory. The next two statements "BCD" and "JMP" are equivalent of "GOTO" statements in Basic while "RTS" means return to entry (usually back to Basic).

As the objective was to improve the running speed, I tried to compare the program with its equivalent in Basic. Before I had reached to the beginning of the machine code program, by pressing the button on my stop watch, the program had already completed its task. Clearly, I had the speed I needed and an accurate

reading of that speed was irrelevant.

Some major problems remained. I still had to find a method of gaining access to high resolution graphics, the use of the sound modulator and how to input from the joystick during a program. Many of these difficulties were overcome after I obtained a copy of the valuable pamphlet *Information for Machines (Code Users)* published by Dragon Data but which does not accompany the "Dream" package. Unlimited copies of this pamphlet are available free from Touchmaster, Kenley Industrial Estate, Mergon, Port Talbot SA12 2PE (Enclose a large SAE.)

Armed with this essential information I was able to convert my "Space Shot" program from Basic to machine code, as listed below, and to achieve the laser shot speed that my space fiction program required.

```
100 78 204 128 78 32 167
104 128 78 128 188 128 18
182 1 30 129 0 3 39 7 129
80 39 28 128 78 111 142
5 204 188 128 128 142 39
220 78 142 5 204 188 128
187 180 142 6 0 39 28 128
78 74 142 5 252 188 128
128 132 39 205 16 142 6
288 188 130 167 180 142 5
200 39 5 128 78 89 142
0 0 188 128 142 6 200 39
171 248 252 0 180 284 39
7 150 128 39 3 128 78 114
142 5 204 188 128 128 142
39 3 128 78 18 142
0 0 128 0 75 230 130 139
30 39 3 128 78 153 142
132 128 142 39 128 134 132
187 132 200 160 142
5 14 39 3 128 78 101 134
143 188 32 167 132 88 148
5 204 40 3 128 78 184 128
39 38 142 5 204 188 142
5 223 188 130 178 182 188
4 0 3 39 3 128 78 203 128
78 36 142 4 0 134 142
187 128 142 6 0 39 3 128
78 229 142 5 204 154 142
198 132 187 128 201 132 134
128 188 142 142 5 188
187 128 142 5 182 39 3 128
78 1 142 5 180 188 8 134
143 88 142 5 182 40 5 187
132 128 78 14 128 78 14 142
4 32 188 128 128 181 39
18 142 4 84 39 3 128 78
35 1 142 4 32 134 181 167
132 128 78 14 142 4 84
16 142 4 84 188 182 187 130
140 4 32 39 128 78 85 142
5 180 18 142 5 153 188 128
187 180 142 5 182 34 3 128
78 180 5 158 183 5 181
128 78 144 142 4 84 180
128 142 4 95 39 7 128 142
39 248 128 13 180 252 34
134 13 183 252 34 128 78
284 142 5 182 134 143 187
128 140 5 224 39 3 128 78
132 128 78 44 87
```

Space shot program listing

Tim Love's

CRICKET

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You have to wait a bit before it starts, but the game is well worth the wait, with
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Items of full help Eddie to restore his strength, while skeletons of previous victims sap his strength. There are also snakes that sporadically come awake that Eddie must avoid at all costs.

The display shows the plan view of one of the rooms with Eddie in the middle. Movement is achieved using the cursor keys, though you can define your own key controls as directed by the program.

Pressing the "M" key displays a map of the maze provided Eddie has managed to locate it.

Objects are automatically picked up as Eddie enters a room and his willpower is displayed at the left of the screen and automatically restored when appropriate. To escape, Eddie must search for the five keys that will allow him to head for the exit and freedom.

To add incentive to the game, there is a "Back Track Champ" competition. On

finishing the final stage of the game, watch the screen and complete the entry form enclosed with the game. Five winners will then be invited to attend a play-off at Incentive's offices. The winner will win a complete Cursura Disk Drive system worth nearly £300.

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Snake

From David Idman in Kent
In THIS game, a snake wriggles around the screen and you must shoot from the centre of the screen at the end segments of its tail.

There are two levels of play and you can

decide on how many shots you would like. Level one is easier and the more shots you take the better chance you have of winning.

A score may only be made if the snake is completely destroyed. Control keys control the snake's direction, and with very careful use, you can keep one shell on the screen for the whole game.

Program Notes

70-160 Draw title screen

180-220
230-360
370-470
480-520
530-580
590-680
690-750
760-830
840-890
900-950
960-1000

Data for title screen
Initialise variables
Draw game screen
Shoot
Hit routine
Check that shell is still on screen
You are dead!
Play again
You have won
Run out of shells
Instructions

```

10 REM      SNAKE      --
20 REM -- DRAW TITLE SCREEN --
30 REM -- VERSION 1 --
40 DIM X(100),Y(100)
50 GOSUB 960
60 GOSUB 1040
70 REM -- TITLE SCREEN --
80 FOR X=0 TO 43
90 FOR Y=0 TO 30 STEP 2
100 SET(X,Y,0)
110 NEXT:NEXT
120 RESTORE
130 FOR K=1 TO 70
140 READ PD
150 PLOT(PO+1024,207
160 NEXT
170 REM -- DATA FOR SNAKE. --
180 DATA 97,98,99,100,101,103,107,1
19,111,112,115,118,120,121,122,123
20,124
210 DATA 129,135,136,139,141,145,14
27,149,152
220 DATA 161,162,163,164,165,167,16
9,171,175,176,178,179,177,179,180,
184,185,186
230 DATA 197,199,202,203,205,209,21
1,213,216
240 DATA 228,228,227,228,229,231,23
5,237,241,243,246,248,249,250,251,
252,254
250 REM -- INITIATE --
260 X=1:Y=1:X2=30:Y2=16:C=1:L=
0:R=11
270 REM -- SET COURSE OF SNAKE --
280 FOR K=2 TO 60:X(C)=K:Y(C)=4:C=
C+1:NEXT
290 FOR K=4 TO 29:X(C)=60:Y(C)=4:C=

```



```

540 B=R+1:IF B>177 THEN B=1
550 GOSUB 670
560 GOTO 370
570 RESET I(32,Y2)
580 X2=X2+A:Y2=Y2+B
590 REM-- SHOT OFF SCREEN? --
600 IF X2<0 OR X2>60 THEN A=0:GOTO
610
610 IF Y2<4 OR Y2>29 THEN B=0:GOTO
620
620 SET I(3,Y2,B)
630 RETURN
640 X2=X1:Y2=Y1:B=B+1
650 PRINT#16,LE=S;" SHOTS ";
660 IF S>0:LEVEL=1 THEN 710
670 SET I(0R,Y1R,1)
680 RESET I(0R-(10-L),Y0R-(10-L))
690 RETURN
700 REM-- GOOD/BAD LUCK? --
710 CLS
720 PRINT#134,"you"CHR$(128)"are"CHR
CHR$(128)"dead";
730 SOUND#0,15
740 GOTO 900
750 GOSUB 640
760 PRINT#368,"play"CHR$(128)"aga
n"CHR$(128)CHR$(128)"y"CHR$(128)"n
"CHR$(128);
770 IN$=INKEY$:IF IN$=""THEN 770
780 IF IN$="Y"THEN 60
790 IF IN$="N"THEN 770
800 CLS AND I(1-1)
810 PRINT#130,"E N D   O F   P L A Y
R A M";
820 PRINT#416
830 END
840 CLS
850 PRINT#66,"YOU SCORED"(60-LE)-
S*10;"POINTS"
860 IF (60-LE)-S*10>HI THEN HI=(
60-LE)-S*10
870 PRINT#130,"HIGH SCORE"HI;"POINT
S"
880 PRINT#194,"      WELL DONE"
890 RETURN
900 CLS
910 PRINT#66,"YOU DIDN'T GET IT AL
L"
920 IF L=1 THEN SET$="SEGMENT" ELSE
SET$="SEGMENTS"
930 PRINT#130,"YOU HIT"LE;SET$
940 PRINT#134,"      HARD LUCK"
950 GOTO 750
960 REM 750
970 REM-- OUTLINE --
980 CLS
990 PRINT#33,"THE PROGRAM YOU ARE
ABOUT TO
    WHICH
    A SNAKE WRIGGLES AROUND THE E
DGE
    OF THE LAWN READY TO POUNCE ON
"
990 PRINT"YOU IF YOU DON'T SHOOT H
IT
    STARTING AT THE END OF HIS T
AIL
    AND WORKING UP TO HIS HEAD."
1000 PRINT#468,"PRESS A KEY...";
1010 EXEC 41194
1020 RETURN
1030 REM-- SKILL FACTOR --
1040 CLS
1050 PRINT#32,"USE THE ARROW KEYS
TO DETERMINE
    THE DIRECTION OF YOUR G
UN."
1060 PRINT"," ENTER HERE WHICH SHO
TS LEVEL
    YOU REQUIRE, THE LEVEL #1
-5A
    IS THE NUMBER OF SHOTS YOU HA
VE
    AT EACH TARGET....";
1070 REM-- WHICH LEVEL? --
1080 INPUT LE
1090 IF LE<5 OR LE>11 THEN 1040
1100 REM-- SHOTS=LEVEL X 10 --
1110 REM=LE*10
1120 LE=INT(LE)
1130 S=0
1140 A=0:B=0
1150 CLS
1160 PRINT:PRINT" WHICH SKILL LEVE
L #1-5A
    1A EASY (STRAIGHT SHOT)
    2A DIFFICULT (DIAGONAL SHOT)
    3S"
1170 PRINT:PRINT
1180 INPUT" ENTER LEVEL...":SK
1190 IF SK>1 AND SK<12 THEN 1150
1200 RETURN

```

Mastermind

From Alan Fyle in Edinburgh

Shed up! A computer version of the popular board game where one player selects a number of coloured pegs and puts them in a sequence hidden from the other player. The second player has to deduce the

colours by attempting to duplicate the hidden pegs.

Clues are given in the form of black and white pegs, black signifying that a colour is correct and in the right position, white signifying that a colour is correct but in the wrong place. In this version, the Dragon chooses the colours at random. Up to ten people can play and "pegs" are selected by pressing the initial letter of the colour—red, blue, green, yellow, orange or magenta.

If one of the first three pegs has been placed and the player wishes to change his mind, the back arrow will delete the previous entry. A maximum of eight guesses is kept. If there is more than one player, running score totals are kept and displayed after each game.

Program notes

Lines 10 to 55 set up the game, taking the number and names of the players and

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44 required, branching to the instructions displayed in lines 1000 to 1100. Note that the black area in line 1080 is printed by typing shift + . Lines 80 to 100 increment the player number and set up the board ready for play. Line 200 chooses four colours at random.

The P = PEEK(275) ... NEXT in line 80 assures that the same "random" numbers are not chosen in each first game after the computer is switched on. In fact, the Dragon knows the colours only by number (1 to 4). The CHR\$ code for each "peg" is

found in the array \$PG read in from the data in line 5000.

The initial letters are decoded by the INSTR function which searches through the string CS, "RBYGYOY". One player, not being accustomed to the Dragon's colours, preferred to call magenta "pink". This can be changed by amending line 58 to read ... CS = "RBYGYOY" ... and by amending the instructions in lines 1070, 1080 and 1100.

Lines 230 to 270 allow the player to key in the initial letters and the Dragon to place

the colours on the board. Next, the computer checks the colours for a match, black pegs selected in line 280, white pegs in lines 280 to 283.

Line 286 checks whether all blue pegs are black, in which case the program passes to the finish routine of line 480. Line 288 increments the line number if this is less than 18 (the eighth turn). If it is not, the program continues in lines 400 to 430 where the player's guesses are considered and the solution displayed. Lines 440 to 480 give comments and scores.

```

1 *****
2 ** DRAGON MASTERMIND **
3 ** WRITTEN BY ALAN FYFE **
4 *****
5
6
7 **INTRODUCTION**
8 CLS:PRINT$234,CHR$(171);:PLAY"
9":PRINT$238,CHR$(175);:PLAY$":PR
10INT$242,CHR$(143);:PLAY"C":PRINT$2
1144,CHR$(157);:PLAY"000":PRINT$427,
12"MASTERMIND":PLAY"L.S."
13
14 FOR I=1TO800:NEXT I:CLS:PRINT$75,
15"MASTERMIND":PRINT$162,"DO YOU REQ
16UIRE INSTRUCTIONS?"
17
18 IF INKEY$=IF I$="" THEN 30 ELSE
19 IF I$="N" THEN 40 ELSE IF I$="Y"
20 THEN 5000 ELSE SOUND120,1:GOTO 30
21
22 40 PRINT:PRINT:INPUT" HOW MANY PL
23AYERS(NP):IF NP=1 THEN PRINT:FOR I
24=1TO NP:PRINT" NAME OF PLAYER";I;:
25INPUT NAM(I):NEXT
26
27 50 P=PEEK(275):FOR Z=1TO P:P=RND(6)
28:NEXT C=C+RND(6):L$=STRING$(18,1
2920):STRING$(14,143):FOR I=1TO6:REA
30D B(I):NEXT
31
32 60 CLS:FOR L=1TO15:PRINTL;:NEXT:P
33RINT STRING$(18,128);:IF Q=1 THEN
34200
35
36 70 PN=PN+1:IF PN>NP THEN PN=1
37
38 80 IF NP=1 THEN PRINT$0," PLAYER"
39:PN="":NAM(PN)
40
41 90 PRINT$134,"guesses":PRINT$151,
42"CLUES":PRINT$165,"displayed":PR
43INT$181,"displayed":PRINT$197,"s
441e":CHR$(128);:side":PRINT$213,"T
45HIS SIDE")
46
47 100 GOSUB 2000:Q=1:GOTO 40
48
49 200 Q=0:Y=1:FOR I=1TO4:A(I)=RND(6)
50:NEXT I:**RANDOM COLOURS**
51
52 240
53
54 249 **PLAYER CHOOSES COLOURS**
55
56 250 FOR I=1TO4
57
58 260 B(I)=INKEY$:IF B(I)="" THEN
59
60 260 ELSE IF ASC(B(I))=0 AND I>1 T
61HEN I=I-1:PRINT$(Y+32+I*3),CHR$(12
628);:GOTO 260 ELSE IF INSTR(1,C,B
63(I))=0 THEN SOUND120,1:GOTO 260
64
65 270 G(I)=INSTR(1,C,B(I)):PRINT$(
66Y+32+I*3),CHR$(B(I)):NEXT
67
68 270
69
70 279 **DRAGON CHECKS COLOURS**
71
72 280 P=0:FOR I=1TO4:IF A(I)=G(I) TH
73EN K(I)=1:PRINT$(Y+32+20+P),CHR$(1
7428);:P=P+3:NEXT ELSE K(I)=0:RND(4)
75
76 290 IF K(1)+K(2)+K(3)+K(4)=4 THE
77N PLAY"0000000000000000":FOR Z=1TO800
78:NEXT I:GOTO440
79
80 300 FOR I=1TO4:L(I)=K(I):NEXT
81
82 310 FOR I=1TO4:IF K(I)=1 THEN 350
83
84 320 FOR J=1TO4:IF L(J)=1 THEN 340
85
86 330 IF G(I)=A(J) THEN L(J)=1:PRINT
87$(Y+32+20+P),CHR$(207);:P=P+3:GOTO
88
89 350 ELSE L(J)=0
90
91 340 NEXT J
92
93 350 NEXT I
94
95 360 IF Y=15 THEN 400 ELSE Y=Y+2:GO
96TO 230
97
98 390
99
100 399 **TOO MANY GUESSES**
101
102 400 FOR I=1TO80:FOR J=1TO10 STEP3:P
103RINT(1026+32+I+J),PEEK(1026+64+I-3
1042+J):P=PEEK(1043+32+I+J),PEEK(1043
105+64+I-32+J):NEXT J,I
106
107 410 FOR I=32TO192 STEP44:PRINT$256
108+I,L;:NEXT:PRINT$480,STRING$(18,1
10928);:STRING$(12,143);
110
111 420 FOR I=1TO4:PRINT$(384+I*3),CHR
112$(B(I));:NEXT:PRINT$402,"= THE
113ANSWER"
114
115 430 GOSUB2000
116
117 440 Y=16:CLS:PRINT$100,"POOR SHOW
118"
119 450 IF NP=1:PRINT$144,"YOU SCORED 2E
120RO":IF NP=1 THEN 480
121
122 460 GOTO 470
123
124 460
125
126 469 **PLAYER GUESSES RIGHT**
127
128 460 CLS:PRINT$100,"WELL DONE":NAM
129(PN):PRINT$144,"YOU SCORED":16-Y:1
130F NP=1 THEN 480
131
132 470 SC(OPN)=SC(OPN)+16-Y:PRINT$228,"
133THE SCORES ARE NOW":FOR I=1TO NP:
134PRINT$(260+I*32),NAM(I);:PRINT$(26
1358+I*32),SC(I):NEXT
136
137 480 IF NP=PN THEN PRINT:PRINT"
138PRESS (ENTER) TO CONTINUE"
139
140 490 I=INKEY$:IF I$="" THEN 490 EL
141SE IF I$="Y" THEN 40 ELSE IF I$="N
142" THEN END ELSE IF ASC(I)=13 THEN
143
144 460 ELSE SOUND120,1:GOTO490
145
146 990

```

Continued on page 28

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```

240 PRINT#2,"player";CH$;"one";PY(
1);PRINT#10,"player";CH$;"two";PY
(2);PRINT#64,"player";CH$;FL$;CH$
;POKE1099,50;POKE1100,45;
250 PRINT#450,"player";CH$;IF FL$
="one" THEN PRINT "two";CH$;ELSE PRIN
T "one";CH$;
260 PRINT "please";CH$;"look";CH$;"
away";
270 PRINT#77,CH$;"type";CH$;"in";C
H$;"word";PRINT#95,"";LINEINPUT
H$;FOR I=(50+LEN(WOR)) TO 127:PRIN
T#1,CH$;NEXT I
280 PRINT#160,"please";CH$;"type";
CH$;"in";CH$;"clue";
290 PRINT#192,"";LINEINPUT CL$;FO
R I=(194+LEN(CL$)) TO 255:PRINT#1,
CH$;NEXT I
300 IF FL=1 THEN P=2 ELSE P=1
310 CL$=SCREEN0,1:PRINT#34,"PLAYER
";P;" HERE IS THE CLUE :";PRINT#
40,(INT((32-LEN(CL$))/2));CL$
320 GOSUB 570
330 IF C=1 THEN CF=CHR$(32);GOSUB
600
340 PRINT#226,"CHARACTERS USED: ";
RE$;PRINT#162,"TYPE IN CHARACTER
";C;" :CH$=INKEY$;PRINT#183,C$;IF C$
="" THEN GOTO340
350 GOSUB 570
360 IF FL=0 THEN LF=LF+1 ELSE LF=L
F
370 IF FL=0 THEN GOSUB 420
380 IF CH=LEN(WOR) THEN GOTO 630
390 IF LF=10 THEN GOTO 600
400 REM PUT CHECK FOR HANGING HERE
410 PRINT#179," " ;LF=0;GOTO 340
420 POKE3,1;POLS:SCREEN1,0;COLORS
,3
430 LINE(140,154)-(196,128),PSET,B
F
440 FOR I=0 TO LF:DRAWGR$(I);SOUND
100,1;SOUND 100,1;NEXT I;IF LF=10
THEN PRINT(144,70),4,3
450 IF LF<5 THEN S20 ELSE PRINT(14
2,87),2,2;PSET(142,87,3);PSET(146,
87,3);DRAW"BR143,89;C4;PIRLE1";IF
LF=10 THEN GOTO 460
460 IF LF=5 THEN DRAW"DMS,20;50";
DAB(7)+DAB(1)+DAB(9)+"BR4"+DAB(9)+
DAB(4)+DAB(8)+DAB(6)
470 IF LF=7 THEN DRAW"BR4"+DAB(5)
+DAB(6)+DAB(1)+DAB(9)+DAB(3)+DAB(6)
+"BR4"
480 IF LFC>10 THEN S30
490 IF LF=10 THEN DRAW"DMS,20;50";
DAB(7)+DAB(4)+DAB(6)+DAB(6)+DAB(9)
+"BR4"
500 DRAWDAB(9)+DAB(4)+DAB(8)+"BR2"
+DAB(6)+DAB(3)+"BR4"
510 DRAW DAB(2)+DAB(3)+DAB(1)+DAB(
2)+"BR4"
520 IF LFC>10 THEN S30 ELSE PLAY"V
31;T6;O0;L1A1;1A;4A;1A03;1C02;4B;1B
;4A;1A;4A;1A"
530 FOR DE=1 TO 1000:NEXT DE
540 RETURN
550 FOR W=1 TO LEN(WOR):LET H=RID
$(WOR,W,1);IF H#C$ " " THEN PRINT#4
20+H," ";ELSE PRINT#420+H," " ;C=1
560 NEXT W:RETURN
570 FL=0;FOR I=1 TO LEN (WRD);IF C
#X=RID(WRD,I,1) THEN S90 ELSE FL=
1
580 IF FL<1 THEN FL=0
590 NEXT I;IF FL=1 THEN RETURN
600 FL=0;FOR I=1 TO LEN(WOR);IF C
#X=RID(WOR,I,1) THEN S10 ELSE FL=
1;CH=CH+1;PRINT#388+I,C$;GOTO 420
610 IF FL<1 THEN FL=0
620 NEXT I;H$=H$+CH$;" ";RETURN
630 PRINT#324,"WELL DONE ANOTHER G
AME!";PY(1)=PY(0)+1;BU=FL;PL=P+P=
BU
640 PLAY"1102L3FG6L1FL3F6BL1PL2T1F
6L3FBL2GL3GML1TA"
650 I$=INKEY$;IF I$="" THEN GOTO 6
50
660 IF I$="Y" THEN PLAY"1102L3FG6
L1FL3F6BL1PL2T1F6L3FBL2GL3GML1TA"
";GOTO200
670 IF I$="N" THEN PLAY"D4FL3C";CL
$=END
680 PRINT#324,"YOU LOST THE WORD W
AS ";PRINT#399,WOR;PRINT#407,"AN
OTHER GAME ";PY(1)=PY(0)+1
690 GOTO 650
700 DATA C2:U60L1D60L1U60
710 DATA L5001R500L10
720 DATA F100H100L10
730 DATA D15
740 DATA R2F3D262L4H0U2E262R12607R
48L4801
750 DATA C3:L6C2L262R2C3U262R6D4R4
BL4
760 DATA C2:D6C4;L2D1R2U1C2U6R3D1L
3D1R3L3U2R
770 DATA R2D6C4D1R3U1L3C2;U6R1,4R4
780 DATA C3:L4R4U4R6C2;R1U2L1C3;B2
U2L8
790 "CHARACTER DATA"
800 DATA R4U4R4D3M13D6R2,R4R2M1U2L1
4R3F026D6R2
810 DATA R4U4U4R4U2R4D6D4R3,R4U2
L4U4R4D4N14R2
820 DATA R4U4R4U3R4D3D6R2,R4U2L4M
R4D2L2F26R2
830 DATA R3M1U2L4U2R4D6D4R2
840 DATA R4U4R4U2R4U4R2;BU2U2R2D2R3
M1U2D2R2
850 FOR I=1 TO 9:READ GR$(I);NEXT I
860 FOR I=1 TO 9:READ DAB(I);NEXT I
870 RETURN

```



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MIKE GERRARD'S ADVENTURE TRAIL

A BUMPIN' month for Dragon adventurers, who can at last feel they're coming in out of the cold with the arrival not only of the first of the Mysterious Adventures series, **The Golden Baton**, but also the first Scott Adams adventure based on our machine, **The Incredible Hulk**. The incredible graphics are missing on this one, though **The Golden Baton** comes in versions for the Dragon 32 and 64 on the one tape, the 64 having graphics that can be toggled on and off by pressing the Enter key.

This is a useful feature that applies to versions of this series for other machines: the graphics are adequate rather than stunning, and personally I prefer to play the text-only versions since I've had a quick look at the pictures. Not that the text in these helps conjure up vivid scenes in the way that some adventures do. They tend to be matter-of-fact, the opening description being, "I'm in a dense spooky forest. I see: Old Cossak — Nothing Leaves. Exit: north, south."

One thing we can be thankful for is that someone has decided to renege the character set into small, neat text with lower-case, which is very pleasing on the eye. I wish all Dragon adventures were done like this, though unfortunately it does nothing to improve the machine's keyboard response and you still have your typical commands like "GO! BARRL," and "GIT ONDL!" if you're too nimble with the typing digits.

What this series doesn't go in for is 'bed features', so you can't be sure that every object you find will have a purpose... eventually. Something you do need to remember is the difference between the two commands "EXAMINE" and "SEARCH". Examine suggests a visual check of an object, whereas a more thorough Search might reveal something hidden beneath or inside.

The initial locations are all in and around the forest, one path being blocked by a savage wolf. Finding the means to deal with that isn't too difficult, though I haven't yet figured out what use a dead wolf is in the scheme of things.

The adventure is in three stages, and once you've explored the outdoors there is a castle to try to enter, which leads to the Gargon room (where a knowledge of Greek mythology might come in useful) and then finally on to the search for the Golden Baton itself which is via one of the earlier forest locations.

The Baton is to restore peace on your

lands, if you are interested, and the adventure itself is tricky and intriguing, if taking something in atmosphere. There are really "Sudden Death" routines, you always seem to be given fair warning if something nasty is about to happen, so you can retreat and think again, and I'd certainly recommend this to the Dragon adventure addict.

It's an expensive month for recommendations, as your first chance to sample a Scott Adams title shouldn't be missed either. It's a pity his own series of adventures isn't yet available... though considering the problems I'm having with the Incredible Hulk maybe that's just as well at the moment. The opening scene doesn't leave much room for manoeuvre, being a very stark: "I'm Bruce Banner, red hand and foot to a chair... What shall I do?" Obviously you need to turn into the Hulk, and a read through the accompanying leaflet suggests how this might be achieved. In fact at the end you're given coded clues if you're really stuck in that first scene, though I can assure you there's at least one other command that will help you escape.



The adventure is littered with signs to read, and one of these informs you that the purpose of the adventure is simply to collect as many gems as you can and return them to a certain place... which you discover by reading yet another sign. To get there, though, you have to get out of the dome where you have been imprisoned. As Bruce Banner you will be killed by rocks in the tunnel leading out, so again you have to find a means of turning into the Hulk.

An example of the Scott Adams style of

humour comes in a field where, if you wait around too long, alien army ants emerge from holes to attack your eyes and kill you, even as the Hulk. Next time round you try to be smart and enter "CLIQUEE EYE!" only to find that they attack your nose instead.

Scott Adams' technique is not to go in for the type of adventure with two hundred locations and more, but to restrict the numbers of places and concentrate instead on the cleverness of the tasks to be solved. Once out of the dome you are in a field, and whichever way you move from here takes you to a fuzzy area. North of here is a small underground room which contains both a gem and an egg. If you try to take the gem from the egg explodes and kills you, as the earlier technique of turning into the Hulk doesn't work here, so you're party Bruce Banner instead.

If you hang around trying to figure out tactics the room eventually fills with poison gas and you die... or rather, in the Scott Adams tradition, you are transported to Limbo and can start again with the game state as it was. If you want to start from scratch you must "QUIT", and naturally there's a "SAVE" facility.

Another sample of the problems you'll get is in the very first location where, once you've escaped, various items are revealed to you including a large iron ring set in the floor. It won't budge if you try to move it, and again you're Bruce Banner, with no apparent means of turning back into the Hulk in this location once you've escaped from the chair. You can become the Hulk in the next location, but return to this room and you're Banner again... it's all to do with these strange games, you understand.

The adventure has a vocabulary of some 120 words, and like **The Golden Baton** the commands are in the usual two-word form, both adventures accepting abbreviations of the first four letters of a word.

Both adventures are well-packaged and documented, and I'm sure you'll get your money's worth from both. **The Golden Baton** is available from Channel 8 at 51 Fishergate, Preston, Lancs PR1 6BH (price £9.95), and **The Incredible Hulk** from Adventure International, 119 John Bright Street, Birmingham (CT 96). ■

Each month Mike Gerrard will be looking at adventures for the Dragon. If you have an adventure you want reviewed or you need advice or have queries to offer write to Mike Gerrard's Adventure Trail at Dragon User.

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If you've got a technical question write to Brian Cudge. Please do not send a SASE as Brian cannot guarantee to answer individual inquiries.

Dragon Answers

Down in the dumps

LAST MONTH I purchased a Microline 80 printer for my Dragon. Is it possible to "dump" an entire screen full of either text or graphics (hi-res or low-res) straight onto paper?

Also, I wish to buy a colour monitor for my Dragon. Could you advise me of any possible suppliers and prices?

David Mann
Larnough, Suffolk

THE PROBLEM here is that in my knowledge the Microline 80 printer is not capable of producing high resolution graphics and as a screen dump is not possible.

Crescom Computers can supply a screen dump for the Sordana CP108A and SOMP 100 for £2.95 from Windy Hook, Gainshead, Tyne and Wear. Dragon are source code types of £5.99 for dumps in the above printers and the Epson from Crescom, one 100, Palmer's Green, London.

Direct Electronics Displays can provide a JLE 14 inch colour monitor with necessary leads for the Dragon for £297 including post and packing. This monitor also handles the Dragon's sound output. It is available from Unit 7, 50/51a High Road, London N17 or telephone them on 01-866 6847.

Sweet dreams

I HAVE a Dream cassette, but the Dream program won't save my assembler programs on to tape. My Orion TR30 cassette recorder has given me no difficulty prior to this. Can you tell me what the problem is?

Dorothy Lawther
Bartley, Leeds

THE PROBLEM with the Dream assembler program is that it records the cassette header tape length in only 4 bytes. This can cause problems with some cassette recorders, especially those with automatic level control. The solution is quite simple, but it does result in programs taking longer to save and load.

Assuming Dream has been loaded at its usual position start-



ing at 20001, before EXECing the program type the following:
PROM 25786, 215 : PROM 25786, 145

This should prevent any further saving with 10 errors using Dream.

Joyless Joysticks

WHEN I have my joystick connected to my computer the keys will not work. Should this happen, and if so could you tell me what to do about it because this is the second Dragon that I have had.

Corbin Myster
Dorby

THE PROBLEM is almost certainly due to your joystick and not your Dragon. The most likely fault is that the fire button is short circuiting, preventing the keyboard from being scanned properly. Try using some different joysticks, or your joystick on a different Dragon.

Break key disabled

COULD you please tell my why, after typing in the pole numbers for disabling the break key, I am still able to break into my programs when it comes to an input command?

I have checked the pole number and found no errors. Surely, these pole numbers are not very good if when my programs come to an input command I am unable to press break. Could you please tell me how to disable the break key when it comes to an input command.

Joyce Mitchell
St Portchester

THE METHOD which is widely used to disable the break key does not take into account input lines, the main advantage of this method is that it is short and easy to enter.

A better method of disabling the break key which does take into account commands like INPUT AS is the program listed here. This program has the disadvantage of being somewhat longer, but it does the job and can be used with the LIST disable routine published previously (Dragon User, June 1983) if required.

```
5 DISABLE BREAK KEY  
  (INC INPUT LINES)  
10 CLEAR:32500  
20 FOR I=0 TO 95:READ A:  
  DATA 32500+1,3ALU:80+  
  80:INOUT  
30 DATA 32,37,30,37,31,33,  
  35,37,34,37,31,30,35,31,37,  
  31,34,37,31,34,35,30,37,  
  37,31,35,31,32,34,14,35,  
  30,30,30,30,30,37,30,31,30,  
  37,34,31,35,32,37,37,35,30,  
  35,34,34,18,30,37,30  
40 EXEC 32501
```

High-res savings

I AM able to turn the resolution pictures at a block on tape but I have tried to save high resolution pictures and have had no luck. Please could you tell me if it is possible to save high resolution graphics as a block on tape and if so how.

Al Backhouse
Blackley

IF it is possible to save high resolution graphics to tape, in a similar manner to saving low res screens. However, you need to check how much memory the made you are in use. For example, Ponder 3 and 4 use 8K of

memory, whilst Ponder 1 and 2 use 3K. To save a screen starting at graphics page one in either mode 3 or 4 type:
SAVEIN "PIC", 1536, 2076, 32848
and for modes 1 or 2 type:
SAVEIN "PIC", 1536, 4467, 32848

To reload the screens later use LOADIN "PIC".

Accessing m/c routines

COULD you please let me know if it is possible to access any of the machine code routines in ROM (or in Dip) to record or read the software disk, from a machine code program. These files contain only hex-code in the RAM.

Andor Parris
Paris

THE ROUTINES you need are stored in the Expansion ROM. The following locations need to be set up before calling the routines:

```
235 = Disk base (0—30)  
237 = Disk sector (1—10)  
238-29 = Address of data to be saved, or address to which data is loaded
```

Then call the following routines:
JDR 49408 to save a sector to disk
JDR 49412 to load a sector from disk

Take that!

I AM attempting to write a "Joey" type program using Basic. Could you please explain how I can produce a "break" type sound effect which would not affect the program running.

Al Teulier
Berthel
Exton

USING Basic it is not possible to mix sound and moving graphics at the same time. A "Break" or "Kick" type of sound can be made from Basic using the Play command with a very long sample. The following will give the desired effect:

```
PLAY "B0,N01,1200;T000,AAAA  
AAAA,T00,AAAA,T00,AAAA,T00,AAAA"
```

If you split this up into several Play commands and move the graphics between each you can get the effect of moving graphics and sound at the same time.

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It also plans to broaden programs on air conditioning for low-income families, to help them save 10 to 15 percent on energy bills for the summer. The program will be available to 1.5 million families, and the program will be expanded to 2 million families by 1990.

REPORT
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THE MAY competition brought in some very interesting entries for the "Prime-search" problem. Readers were invited to complete a six-by-six grid of digits which was to contain as many different primes as possible. The primes could be read up or down, from the left or right or diagonally — with the only restriction being that the four digits 1, 9, 8 and 4, already in place of the grid, were to be left in position.

This last point was a condition that some entrants failed to realise and, of course, these entries had to be disqualified. Other replies also had to be eliminated for inaccurately listing the number of primes present — either by duplicating the same primes or including non-primes on the lists. In two cases, this was particularly unfortunate, as both entries would have been potential winners, having scored higher targets than the eventual prizewinner.

Prime search

This "prime-search" competition was unusual in that there was no absolutely correct answer — just the highest possible score obtainable to decide the winner.

In compiling the problem, the highest score that I managed was 87, and so I reckoned that a score of one hundred or over would be pretty good going. The highest score received had achieved an amazing 150 primes, with the runner-up also on his heels with 146, although, as has been stated, both of these entries had to be eliminated. This was a difficult decision, but it was decided that in fairness to entrants who had submitted accurate answers, these entries should be allowed. To quote from *it is different* "... virtue is triumphant only in theoretical performances."

Nevertheless, a score of 150 certainly deserves accolades so, if anyone would like to try to improve on this record, here is the grid in question:

3	3	7	1	9	9
7	1	6	3	6	9
9	1	9	4	2	1
3	9	1	6	7	3
4	3	9	7	4	9
9	3	3	7	3	1

Don't forget that the terms of the question require that the four digits 1, 9, 8 and 4 be placed in the centre four positions of the top-left to bottom-right diagonal.

The theory of constructing a prime-search grid is particularly involved. The natural tendency of scoring all even digits

and fives is in itself restricting, as only a small portion of the primes are made up solely from these digits. So, the judicious introduction of a few even digits would seem to be a better move than their complete avoidance, but exactly which, and how many, makes for a difficult, if near impossible analysis.

This month's competition also involves completing a grid, although this time, the object is to produce as many different squares as possible.

	2			3	
	7			8	

The numbers can read in any direction — up, down, left to right, right to left, or diagonally, but only in a straight line. For example, the sequence 80225 would contain the squares 8225 and 25 in one direction, and the square 2209 in reverse. Remember that the four digits already on the grid must be left in place. Note that in listing your squares, any square can only be counted once, even though it may appear in the grid several times.

To enter the competition, copy your completed grid on to a sheet of paper and then list clearly all the squares that you have found. You must show how you arrived at the answer with the use of a Basic program. At the top of the page state the total number that you are claiming. The winner will be the entrant with the highest score.



Searching for squares

Complete Gordon Lee's grid to win £200 of
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TO WIN the software you must show both the answer to the competition and how to solve it with the use of a Basic program developed on your Dragon. (Please do not send in a cassette containing the answer. As a tie-breaker complete the following sentence in 10 words or less: "I want Salamander's range of software for my Dragon because...")

Your entry must arrive at Dragon User by the last working day of October. The winner and the solution to the quiz will be published in our January issue. Entries will not be acknowledged and we cannot enter into correspondence on the result. You may only enter the competition once.

July winner

THE WINNER of July's competition (and recipient of a H404 thermal transfer printer from Brother) is Mrs Katherine Mayer of Roath in Cardiff.

Katherine correctly gave the 18 states that were on the professor's list.

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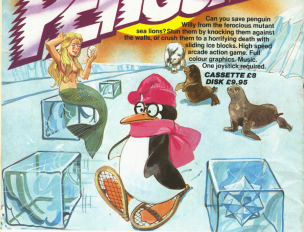


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