

# DRAGON USER



*The independent Dragon magazine*

60p May 1983 Volume 1 Number 1

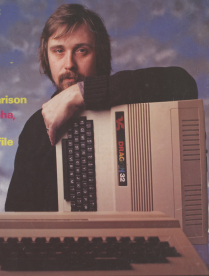
**New Frontiers:  
Data files,  
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survey**

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# Salamander Software

# DRAGON USER



May 1983

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

Articles which are submitted to Dragon  
User for 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, whenever possible, be computer  
printed on plain white paper and be accom-  
panied by a tape of the program.

We cannot guarantee to return every  
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copy. If you want to have your program  
returned you must include a stamped,  
addressed envelope.

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

# Contents

## Letters

Advice on buying a cassette recorder and  
on saving programs (don't blame it all on  
the Dragon)

## News

The Dragon is to get more memory and  
has nine competitors — one to battle with  
the BBC B, the other with the IBM PC.

## Clubs

A personal account of the pleasures and  
difficulties of setting up a users' group.

## Software round-up

Who said there was no software for the  
Dragon? Not John Squire who found  
packages that will push the machine to its  
limits once arcade games lose their thrill.

## In the red corner

Have you got the right machine? The  
Dragon takes on the BBC machines, the  
Vidco and the Spectrum. Boris Allen  
referees.

## Microdeal talks

Unsham Taylor went to Cornwall to talk to  
John Syme of software house Microdeal.



# Editorial

Welcome to Dragon User — Britain's first monthly magazine devoted entirely to  
helping owners of Dragon computers.

It is nearly nine months since we first began to hear rumours that a little known toy  
company was about to launch a new home computer. At the time Britain was having  
problems with its Spectrum computer but we still thought it unlikely that a newcomer with  
no experience of the market would be able to break in. Then the Dragon 32 was  
launched in August. It was undoubtedly a good and powerful machine. We were still  
sceptical. The documentation was poor and the parent toy company seemed to be in  
serious financial difficulties.

Dragon Data's Managing Director, Tary Clarke, has, however, managed to pull it off.  
Various financial institutions bought and refinanced the company which enabled it to  
build up the production rate to come closer to meeting the unexpectedly high demand,  
high street retailers and dealers accepted that the machine was going to prove popular  
and software houses began to include Dragon 32 models in their ranges.

Dragon owners can now look forward to a long relationship with the company. Work is  
being done to offer upgrades to the Basic and the memory of the Dragon 32. New, more  
business orientated, computers are being developed at the moment so that Dragon can  
offer a range of computers of different capacities at different prices, so becoming less  
reliant on the possible vagaries of one market.

Versions of the Dragon 32 are now being sold in many parts of the world. Later this  
summer a plant in the United States starts production for the American market. On top of  
the 100,000 Dragons which will have been sold in Britain by Christmas we can look  
forward to the additional support of up to 200,000 Dragons in the US.

All this means that Dragon owners can grow with their machines, can bank on the  
support of any number of software and hardware companies which will, in turn, offer an  
ever growing range of add-ons and upgrades with which we can continuously improve our  
machines.

In Dragon User we will aim to keep you up to date with all the latest developments from  
Dragon, the latest software, which we will test and rate, and the latest hardware. We will,  
also, with your help and discoveries, learn how to make the most of the machine we  
already have.

## Moonbase Alpha

See if you can land your shuttle on the  
lower pad at Moonbase Alpha.

## Command graphics

David Lawrence (featured on the front  
cover) introduces two of the most  
under-used commands in Dragon Basic,  
GET and PUT.

## Data filing

How to save bodies of data on tape so that  
they can be used later, avoiding the need  
to re-enter information manually each time  
a program is reloaded.

## Printeracing

Making the most of your Dragon printer —  
from using the control codes to making a  
high resolution copy of the screen.

## Open File

We publish your programs: the month  
winners of an old Chinese board game,  
loading direct from the hex dump and the  
mysterious Dragonnet.

## Dragon Answers

Increasing speed, muddled joysticks,  
using vectors, finding out about SAM —  
your questions answered.

## Competition Corner

Win a printer and meet Agog.

# THE DRAGON DUNGEON

## DRAGON GOODIES

Now that we've shifted the rack out of the future chamber, we've doubled our storage space and now stock the widest range of Dragon software available from a single UK source.

The Dungeon Master has been persuaded to expand his mighty little Place List and we can now send you a descriptive catalogue (with an outline of each program).

**Best-selling books in stock:** "Dragon Companion" £4.95, "The Working Dragon 82" £5.95, "Dragon Extravaganza" £4.95, "Advanced BASIC for the Dragon" £8.95.

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## DRAGON OWNERS CLUB

The Dragon Owners Club of the Dragon is the UK's largest (and not members just from the Isle of Wight to the Arabian Gulf and Zambia, should we say the world's largest!). The monthly club Newsletter "Dragons' Teeth" is packed with news, tips, reviews, programming advice, members' games lists, competitions, special offers and even free Group membership! We have now introduced a "Dragon" Club to scan its developments in the 1988 Year.

The Magazine of "Dragon's Teeth" is up on the front covers! Members of software stores and the clubs to get the first Dragon Club price that comes into stock. Dragon Club badges, membership, etc. to attract Dragon-owners!

Annual membership, including "Dragon's Teeth" £10 (UK members), no charge for telephone £10 (US \$20 overseas).

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## Useful commands

THE FOLLOWING information about the use of Pater may be of use to other Dragon users.

(1) When the Dragon's manual says "Pater behaves in a similar way to Clear" they mean exactly the same way — all numeric and string stores are cleared and arrays 'unfilled'.

(2) The Dragon's manual also points out that "As each graphics page requires 1536 bytes of memory only reserve what is needed". Because the Pater command's lowest number is 1, if your program uses no graphics at all you will waste 1536 bytes of memory in Page 1.

It is possible to overcome the second problem. As Doug Dixon pointed out in P.E.W. (vol 2 no 7) the start and end addresses of Basic are at PEEKS 76 to 78. So instead of using Pater set in direct mode Pater 75.8 to move the start address to 7537 and Pater 77.8 to move the end address five bytes to the right to 1538. Now to check this type Pater Peek (25) + 258 + Peek (26).

for the new start address and Pater Peek (27) + 258 + Peek (28)

for the new end address. Now you gain an extra 1.5K of memory.

An added advantage is that your program is protected. Try calling any graphics mode and your Dragon will not let you. As this new command is so useful why on earth was the Dragon's ROM not designed to allow Pater 2?

Anthony Schwartz,  
Anderley,  
Berkhamstead,  
Herts.

## Dragon fodder

A 18-YEAR-OLD girl won a Dragon 32 for the school recently. It's a friendly Welsh Dragon. I would like to feed it an feed attractive and good educational programs. The former is easily found but the latter is rare indeed.

Could you through your magazine ask your readers to send me for free details of cassette, programs etc or at least the names of software houses spe-

cialising in Dragon fodder?

You see at the moment I need the food, by hand and I don't like the glint in its optic eye!

Save me!  
Peter Thomas (Head keeper),  
Woodlands Junior, Bath  
P.S. I'm sure lots of teachers will read your magazine, so they would benefit from such information.

## Word help needed

ENCLOSED WITH this letter is my last year's subscription to Dragon User.

One article which would be of great interest to me would be a Phonetic Dictionary for use with "Computer Word". Personally I have found great difficulty in constructing words. If an article is not possible for some reason then possibly ask readers to submit what words they have constructed and up-date their each month.

J Gale,  
Stratford-on-Avon,  
Warwick.

## Storing problems...

PERHAPS I can help. P.A. Lark (Popular Computing Weekly 3-8 March 1983). I too had problems initially with storing programs from my Dragon on my cheap and nasty (E3.95) cassette recorder. I traced the problem: in the cassette recorder motor taking too long to reach its running speed, with the result that the first few bytes of the program header were corrupted when trying to 'save a program'. The difficulty was completely overcome by always starting the cassette recorder manually before pressing Enter. There was no corresponding difficulty when 'loading'.

The Dragon must have a delay built into its operating system to permit the cassette recorder to reach the correct speed before it begins to send data. In my case, this delay is insufficient, but presumably by slowing a suitable rotation it would be possible to manage this delay and ensure error-free storage of data regardless of the cassette motor characteristics, while still using the

facility to control the cassette remotely. I would be grateful to hear of any suitable Pater values.

For my particular set-up, both 'loading and 'loading are now totally reliable and trouble-free. When typing a long program, I always stop every ten minutes or so to save the work done so far. This ensures that if anything does go wrong, the amount of effort wasted is kept to a minimum.

S J Beal,  
Addington,  
Croydon,  
Surrey.

## Solved once...

I TOO experienced considerable difficulty in loading and saving programs from a brand new Sansui recorder, purchased with my Dragon 32.

I discovered after many frustrating hours, that the leads were very badly connected, and after my husband had soldered the connections in the ear, mike and remote jacks for the cassette recorder, it appeared my problems were over. A few months later, the other end (which plugs into the computer) became disconnected and this too, had to be soldered into position. Happily, I now have no problems.

I do feel that this should not be happening and that these leads should be checked before leaving the factory. I now have a little trouble with the connection from the mains to the computer. The plastic was not in the clamp and was causing very bad connections.

M J Worley,  
Mossley, Par  
Dunstable

## Solved twice...

IF YOU are having loading problems: first put a hand microphone, or other source, into the recorder to test that it does actually record.

By the bye, I would like to obtain the following, but Tandy seem to have taken umbrage at the Dragon's use of the 8008 and are refusing to co-operate. Any suggestions?

(1) Colour Computer Technical Reference Manual (Tandy).

(2) Going Ahead With Extended Color Basic (Tandy).  
(3) Basic Microprocessors and the 6800 (By Ron Bishop, Hayden Book Co. Inc.)

B I Gearing,  
Sharnbrook-by-Sin,  
West Sussex.

## Recorder advice

SINCE BUYING a Dragon in December 1982, I have used four different makes of cassette recorder with it, and found that the best results were obtained from a Sansui Radiocassette (R18.95 from Poundland). This is much more consistent than the Sony, Ams and Hitachi cassettes which I have also tried — this may be due to circuitry relating to Phono, since some more expensive machines have delay mechanisms to prevent smearing at the tape (which can cause the tape to stretch).

However, even using the Sansui I can't get rid of all 140 errors and so the following is the procedure I follow when saving a program:

10 Key program  
20 W=1  
30 Run program  
40 If error then delay error: goto 30  
50 Pate 65404.0 (in case there was a Pate 65405.0 speed up routine in the program)  
60 Press record on the cassette  
70 Cue "Program name"  
80 Press rewind on the cassette  
90 Skipt "Program name"  
(This is because Cloud deletes the existing program from start, but Skipt doesn't).

100 If 140 error then rewind cassette: check playback volume: if it was okay, then W=W+1: goto 60 after change volume: goto 60.

110 The save is successful — switch everything off and go for a drink.

The above procedure's results is always having a retrievable program, and so no losing effort is wasted.

P McCormick,  
Langley,  
Manchester.

P.S. The highest volume I have had it reach is 3 — if it reaches a sufficiently high level to drive you towards alterations, it may be better to change your cassette recorder.



## No Dragons at Smiths

W. H. Smith's has no plans to stock either the Dragon 32 or software to run on it.

It seems both Smiths and Dragon are too busy to consider it.

Smiths' John Roland commented: "What with the Spectrum, Commodore 64 and Citi-

we have enough on our plate already."

Dragon's Richard Wadman said: "They are interested but at the moment we haven't got the capacity. I think it would be unfair to take on an additional retailer the size of Smiths at this time."

Also, since Boots already stocks the machine, it is not in Dragon's interest to have two high-street stores competing on price.

## New factory opens



Production will reach 10,000 Dragons a week

production of Dragon computers is to be stepped up, now that the move to new premises is complete.

The new factory at Kettle, near Port Talbot, has a much increased manufacturing capacity compared with the old site within Mutor.

Dragon is now manufacturing just under 5,000 machines a week.

"The move went very smoothly and, over the next couple of months, we shall be stepping up our production to 10,000 units a week," commented Dragon's Tony Clarke.

However, it will take some

time for production to exceed demand.

Dragon 32 machines were in very short supply immediately prior to Christmas and all of Dragon's outlets — including the Boots stores — are still receiving a restricted allocation.

"Always when you get a great many orders, there is a temptation to throw everything you can out of the door," countered Clarke. "But that is counter-productive."

All our machines are stock-listed and we have had to adjust a strict allocation system for all of the Dragon's customers."

## More micros to follow memory

HAVING sold over 50,000 Dragon 32 machines, Dragon Data plans a formidable hardware expansion in 1983.

First came the discs, planned for the end of April. A single-disc system, with interface and disc operating system, will cost £275.

The package uses a half-height, 5¼-inch single-sided, single-density 48-tracks-per-inch drive with a capacity of 180K formatted (144K unformatted).

Dragon Data is also licensing the 0559 disc operating system (around £80) and Basic OS, Pascal and VisiCalc PC compilers (all around £40) from Microvision in the US.

These will be available in the middle of May, at the same time as the expansion box

giving the Dragon 64K Ram. This add-on may include two RS232C interfaces (not finalized) but should cost around £30.

An 80-column card (micro-chronex only) is in the final stages of development and should be out soon.

Software to run the extensive range of business packages available under CIB Excel is also planned — to work with programs under DOS, in use.

Dragon Data also plans two completely new machines, for launch later in the year.

The first will sell for around £450 and be a competitor for the BBC Model B; the second will be a full-blown business system aimed at the IBM PC; Sirius market.

## Trojan lets out light

TROJAN Products is now selling a light-pen for the Dragon.

The unit costs £16 and is supplied complete with a cassette giving full instructions and examples showing how to incorporate the input from the pen into a program.

The light-pen plugs into the joystick port on the Dragon and is addressable from the keyboard.

It can be used to input x-y co-ordinate data from the screen and is also fast enough



Just plug into the joystick port in position to be used in certain types of games.

More information from Trojan Products, 165 Darlway, Dartmouth, Swansea.

## Users get options on assemblers

SUDDENLY there is a reasonable choice of assemblers available for the Dragon.

Dragon itself has two versions on the way — one on cassette and one in Rom. Other packages are available from Compuserver and J Microvision (Micros).

The two Dragon Data offerings are assembler editions with a de-bug facility. The cassette-based version, priced at around £70, is the simpler.

The cartridge version will

follow soon with more extensive de-bug capabilities and will be priced around £40.

Compuserver's assembler is a different sort of package — it is what is called an in-line assembler. Rather than being Rom independent, the cartridge does not interrupt the Basic.

Instead it adds extra commands which allow the assembly language to be added to an existing Basic program. When the assembler

cartridge is then executed it runs through the Basic program poking out and compiling the code.

"The beauty of the package," explained a Compuserver spokesman, "is that the code is embedded in the Basic. That way there is no need for an editor — the editor is already there in the Basic."

The Compuserver C65M assembler is available from PC Box 188, Palmers Green, London N12, price £75.95.

Finally, there is the editor-assembler from J Morrison (Micros). Converted from a 6809 system developed for the SW Tech machine, this is a two-pass assembler which functions independently of the Dragon's Rom.

The package includes error notification (54 codes) and a machine-code monitor, it is supplied in cassette form and costs £27.95. More details from J Morrison (Micros), 2 Glenside Street, Leeds.

## Dragon 32 goes west



Dragon Data's Tony Clarke

THE DRAGON 32 machine will be launched in the US this year.

Three American companies are currently in discussion with Dragon Data with a view to manufacturing the machine in the US.

"Nothing has been finalised yet," said Dragon managing director Tony Clarke. "Whatever happens it will be manufactured over there for economic reasons as a joint venture with a US company."

TAPE software written for the Tandy Colour Computer can be loaded directly into the Dragon 32, using a new cartridge from Compuserve.

Both machines run the same version of Microsoft Basic and have similar hardware. This means that a program keyed directly into either machine will run.

However, because of differences in the input/output routines, when a Tandy program is loaded into the Dragon from tape certain of the Basic keywords are misinterpreted.

Within the machine each keyword — such as Goto or List — is represented by what is called a 'token'. The problem of software compatibility is that in some cases the same token is used to represent different keywords on the different machines.

The Compuserve Decode cartridge simply goes through

## Decode for Tandy tapes

the Tandy program after it is loaded and makes the necessary corrections to the tokens so that it will run properly.

First the Decode cartridge is plugged into the Dragon. Normally this would interrupt the keyboard input but the Decode pin connector has been specially adapted so that this does not happen.

Then the Tandy program required for conversion is loaded from tape in the normal manner.

Finally, the Decode program is run by typing in the command EXEC SHC000.

When the translation is complete the program, now in Dragon 32 format, can be saved to tape.

The cartridge will successfully convert almost any program written for the Tandy Colour computer in Extended Microsoft Basic. The Decode program has been designed

so that it ignores the content of strings.

Machine-code held in sub-routines — used to set up the graphics for example — is not affected by the Decode program. Machine-code routines will work equally on both machines without an adaptation.

"The only possible problem could come if someone has used part of the Tandy Rom in a program without using one of the standard machine-code entry points," explained Compuserve's Ted Cypriak. "But in practice professional software houses tend not to access the Tandy Rom."

"We originally developed the Decode program for ourselves and we still use it on a commercial basis."

Decode costs £18.95 and is available from Compuserve, PO Box 168, Palmers Green, London N12.

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# News Desk

01-828 2449



BRIGHTON-based software house Salamander has announced three new titles for the Dragon. These are Starfighter, a machine-code arcade-type game; Super Hangman, featuring high-resolution graphics and a 1,500-word vocabulary; and Sketchpad, a graphics package. More details from Salamander, 17 Norton Road, Brighton.

## Package additions on the way

IN THE next two months Dragon will launch a substantial catalogue of new software titles.

"We are just finalising agreements for 20 new programs," said Dragon's software development manager, Pam Bolith.

First comes Rail Runner, a Frogger-type game, followed

by 61 Dusters, an adventure game set in the desert, Whirlwind Run and Sheep Treasures.

Computer Voice is a speech synthesiser using string arrays to build-up phonetic codes. These can be used like building-blocks to make up simple sentences which can be incorporated into programs.

Dragon also plans a series of 10 educational programs, aimed at the 4-12 age range. The first two titles in this Young Learning Series — dealing with numeracy and literacy — will be available very soon. Four more titles in the series are on the way.

## Tandy UK puts Dragon at ease

TANDY has denied claims that it is planning legal action against Dragon Data because of the similarity of the Dragon 32 to the Tandy Colour Computer.

"We have absolutely no objection to the Dragon machine," said Tandy's UK managing director, John Sayles. "We do not have any copyright on our computer in the UK."

"It is true that the two machines are similar in a lot of respects — they use the same or very similar Rom packs, for example — but I can tell you categorically that we are not planning any legal action."

"Besides, by the time these things are settled out of court

the machine is often out of date," he added.

Because both machines license the same version of Microsoft Basic and use the same processor some software for the Tandy is directly applicable to the Dragon.

Increasingly, British software houses are looking to the UK for Tandy material which can be easily converted for the Dragon. For example, Microsoft is selling material by Tim Ellis originally developed for the Tandy. The same is true of Compuserve.

Ted Oppenhal of Compuserve commented: "Increasingly, the market is moving to produce standard software for the two machines."

## FOR A LOT OF FUN ON YOUR DRAGON JOIN OUR CLUB

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

### THE STATACOM TOP 10

- |                             |                           |
|-----------------------------|---------------------------|
| Donkey Kong (Microsoft)     | Wizard War (Salamander)   |
| Planet Invasion (Microsoft) | Self (Salamander)         |
| Telewriter (Microsoft)      | Pirates (Automaton)       |
| Strategic Command (Romtek)  | Chess (Dragon Data)       |
| Wastrel (Lehrman)           | Banking Bank Run (Hilton) |

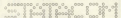
Also: GEMMEL, DASH and DECODER from Compuserve.

**NEW TITLES:** Cosmos Zap, Galactix Antwar, Talking Animal Attack, Ring Of Darkness and more on the way!

**PRINTERS:** On Mordales a specialty, also Epsons & Salscheis.

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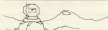
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YOU WOULD THINK that being on the committee of two local careers clubs as well as having a full-time job that involves two or three evenings a week plus doing an evening class in computer programming would be enough for anyone. However, when I first approached Doug Bourne with the germ of an idea about starting a Dragon users' group he was immediately keen. As a local magistrate I also have plenty to occupy my time so the decision to form the Dragon Independent Owners' Association was not taken lightly.

Part of our enthusiasm came from Dragon Data's slowness. As you are frantically unpacking your brand new Dragon, impatient to connect it to your television and perform miracles of programming, a small white card flutters to the floor. A few hours later, realising that you really do need to read that manual, you sit back to take stock and come across that card again.

Part of the card is the usual guarantee. Another part invites the new owner to fill in the printed form and become a member of the Dragon Data Club. Dragon's own user group. Unfortunately, at the time of writing, that is the last you will hear of this club.

How many bored new computerists sitting there at a faultily testing have wished that there was someone they could turn to? Of course many hardware retailers are very good. They must be very patient, listening (and over again) the same problems which customers find as they unravel the mysteries of whatever machine they are the proud owner of.

So it was in the light of thoughts such as these that the IDOA was conceived. We first considered a local group. A quick survey of two schools (to which we have access) turned up a dozen or so Z80s, three or four Spectrums, or odd Vics or two and just three Dragons. On the face of it, therefore, a local group was a non-starter. So we decided to take the plunge and began making enquiries to try to gauge the interest both among owners and within the burgeoning software industry.

A first tentative advertisement brought around 60 requests for information. Within two weeks this had risen to well over 100 so we felt that the need was there. Many of these requests were accompanied by long letters detailing snags that owners had come up against, mostly with tape recorders, and many complaining about the Dragon manual.

The next step was to contact software houses as we felt that we should offer members more than just a shoulder to cry on. The response to our requests for a discount for members was amazing. Within a few days we received not only many letters offering discounted software but also copies of the software for us to evaluate and eventually review in our newsletters.

A visit to the bank furnished us with much needed financial advice. Though of course banks cannot lend money to start an association such as ours, the manager



Doug Bourne (left) and Dave Windle (right)

## Two-man band in full flow

*Dave Windle gives a personal account of the pleasures and problems of setting up a users' group.*

was most helpful in pointing out some of the pitfalls strewn across our path.

The next problem, as one regular pointed out, was one of politics. He was not sure about the ethics of a group run by two people rather than by a committee of members. This is, of course, a very valid point. However, it is a chicken and egg situation — how do you form a committee without having any members in the first place? We decided, therefore, that we would take it upon ourselves to make the decisions and, initially at least, finance the efforts.

We felt justified in making a few pounds on further advertising for members. Our first check came with the first professionally printed work that we had done. Having designed them ourselves, we were surprised at the bill for our information sheets which was more than double the expected amount. It meant that other plans we had for good quality graphic pads and fancy membership cards would have to wait.

It also meant that our newsletter would have to be duplicated rather than printed. However, we hoped members would be more interested in what we could actually do for them than how pretty we were, and in fact this seems to be the case. Our newsletter, the Dragon's Tale is, as yet, only one issue old. The first edition was, of necessity, quite skimpy. A short editorial, a few reviews, some details of our discount scheme and a list of software houses listed (almost) the four pages.

We were pleasantly surprised at the

reaction of members who wrote and congratulated us on the newsletter. This was followed by a letter from one of the software houses involved in our scheme which also was most encouraging.

To be absolutely honest, we were disappointed that after the rush of enquiries the numbers joining us ticked rather than gushed in but that tickle thankfully continues. On reflection how we would have coped with say 200 members overnight is difficult to imagine. As things have worked out we now have a workable system set up and most enquiries are dealt with within two or three days. New members should get a letter of receipt of subscription within the same period of time.

Eventually we hope that it will be possible to form a committee as referred to earlier. The problems of doing so still loom large — the biggest of these being that members live all over the country and in one case overseas. So, at present, the workload is split between Doug and myself.

Doug is our PR man and also our supplies officer. He was unbearable when he received a large envelope recently addressed to "The Marketing Director". He also has the task of contacting software houses and is responsible for keeping the peace when we step on somebody's toes. Once, full of enthusiasm, we failed to read properly a reply from one of the biggest software houses and involved it in our voucher scheme — which was not quite what it had agreed to. However, to its credit, the firm was very fair with us and in fact, under a different arrangement, has offered our members a larger discount than before.

My job, or jobs, are those of membership secretary and editor of the newsletter. I must admit that I am finding it most enjoyable sifting through the letters, as well as very informative.

The first newsletter was a bit of a one-man band as far as contents go but I am sure that this is going to change. With subsequent issues the aim is to get our members to use The Dragon's Tale as a discussion platform and, in my mind at least, it is the most important aspect of our fledgling group.

Already the letters we have received show that out there in micro land are some very active and bright minds.

We hope the Dragon Independent Owners' Association will be able to do a lot more for the Dragon owner. We have to accept that we must learn to walk before we can run. The days when anyone who had anything to do with computers was an electronics wizard are gone. Many of us ordinary but interested people now make up the majority of owners. We all need help however far advanced we are in our new hobby and that is why the IDOA was started, to try to help other Dragon owners by sharing knowledge and information and by providing a platform for discussion on the many aspects of "taming the Dragon".

Further details of the group can be obtained by sending a self-addressed (stamped) envelope to: IDOA, School House, Nevins Road, Rayleigh, Essex.

# Software round-up

*Fighting Samurai and spaceships, manipulating databases and synthesising speech - John Scriven finds software that will push the Dragon to its limits once arcade games have lost their thrill.*

WHEN THE DRAGON appeared last summer, it was encouraging to see that Dragon Data was launching software at the same time. All too often, manufacturers produce good hardware but neglect the software side, forgetting that machines that are sold with games potential will not be bought unless the games are available.

Indeed, computers sell to a large degree on the software support available. Since those early days many more programs have become available, and it is interesting to see what progress has been made since then.

Software for the Dragon is available in two forms - from cartridges that plug into the side and cassettes that have to be loaded via a cassette player. The material available on cartridge consists mainly of arcade type games. As they are written in machine code, they are fast and some incorporate modifications that make them more fun than the originals.

When you purchase any software, check up to see if you need joysticks. The packaging does not always make this clear, and they are often essential. There are several models on the market of varying quality and price, so if you have not yet acquired a set, it is wise to shop around.

## Dragon's own

First of all, the Dragon Data cartridges. Meteoroids is a version of Asteroids, with a few advantages over similar games. It is possible to select the skill level from 0 to 15. It is also possible to use 1,2, or even no joystick. Controlling the errant spacecraft is fairly difficult until you realise that Newton's Laws on gravity are obeyed rather well, and take this into account. Once you learn to cope with this, it is a lot of fun.

The object is to destroy as many meteoroids as possible before you fall out of the flying saucer, which are too accurate for comfort. Individual and total scores are shown in a status table. Unfortunately, the display is in black and white in order to use the highest resolution, but this is inherent in the machine and a problem that occurs in many games.

Comet Invaders is a rather weak version of the old favourite Space Invaders and is somewhat lacking in space. Any one who has played the original would soon tire of this cartridge. It is fairly easy to master, and once you discover how to beat

it, even the prospect of a high score fails to excite.

Starship Chameleon can be played by one or two players and involves destroying enemy rockets by colliding your own craft with them. The interesting difference is that craft are colour-coded according to whether they are made of matter or antimatter. If your craft has the wrong matter status (selected with the "fire" button on the joystick) then you will explode. Few missiles that are smart, in home in on you, add to the challenge of the game. Skill levels from 1 to 8 may be selected and the scores are shown on the screen.

My one criticism of this game is that the background colour is the emerald green that Dragons produce, and with all the high-speed movement on screen you could end up the same colour. On a more serious level, this is more original than Comet Invaders, and to my mind, offers much more of a challenge.

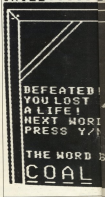
There are two cartridges that involve chasing round mazes, although Dragon Data has avoided calling either of them "Tall-Man".

Cave Hunters presents you with a cave maze, always the same, with four bars of gold at the base. The integral pot-holer has to collect them one at a time and deposit them just outside the entrance. Nothing could be that simple, however - lurking in the cave are unpleasant creatures who devour you when they catch up with you, unless you've recently passed over a power peak, when you have a few seconds to turn the tables on them. This game is fast-moving, entertaining, and more difficult than it at first appears.

Ghost Attack is rather more familiar in design. The object here is to explore up prison pits littering a maze while avoiding the attentions of three ghosts (unless you've recently passed over an "energiser"). There are three levels of difficulty - "easy", "hard", and "tall". This game is fun to play but for some undisclosed reason is more expensive than the other cartridges.

Barrels, the last of the Dragon Data cartridges, is based on a popular arcade game that is not often translated to the home computer format. This is another game where colour has had to be sacrificed for high resolution. You control a small man who must be steered through a series of inter-connecting rooms. Robots inhabit the maze and you have to shoot

# SUPER HANG



The life in your hands - a liver told only the truth

them before they zap you. The walls are electrified, as are the robots, so steady hands are necessary.

As you move off the edge of the screen, another series of rooms appears. It is important to resist the attractions of a lethal bouncing ball called "Ball Driller". He cannot be destroyed and tends to move faster than you can. This is a well-written game and makes good use of the graphics of the Dragon.

The cassettes from Dragon Data cover a wide range of activities and demonstrate the many possible uses for a home computer when arcade games lose their thrill. They are considerably cheaper than cartridges, but naturally take much longer to load and leave you at the mercy of a sometimes unkind cassette opening system. If you've used your Dragon for some time, then you've probably discovered that once the correct level has been set, you have no trouble with your own cassettes, but those recorded on other machines can be temperamental.

Special Selection 1 contains four simple games that tax the parts that arcade games do not reach, namely memory and intellectual skills rather than well-coordinated hand-eye movements. Brain selects two characters from the keyboard



# HANGMAN

LEVEL 2

06 SECS.

HIGH SCORE  
THEODORE

01

SKILL 8

THEODORE



SKILL



ly word of advice during a game. Longer phrases are possible, but I confess I was two days' work before I said, "Eatin' the size of a planet and I up here!" The quality could not be considered anything more than rudimentary, but as an introduction to speech synthesis it has to be good value.

Quest is a cross between Adventure and Kingdom. The aim is simple — to traverse a patch of unpleasant country and invade Moorcock's Citadel. Achieving this aim is considerably more difficult. You need to equip yourself at various markets with men and tools as your progress is slowly revealed on a map of the terrain. My verdict is entertaining — but difficult.

Maidness and the Minotaur is in the mould of traditional text adventures. The challenge is to seek treasure in a labyrinth of passages and bring it to the surface. Inhabiting the many rooms are both friendly and unfriendly creatures. Exploring the many locations and learning the different spells is a time-consuming business, but if you enjoy this sort of game, you will not be disappointed with this version.

## To the limits

There are now many firms apart from Dragon itself which are offering software. In some cases it is not of a particularly high standard — in others it pushes the Dragon almost to its limits. There appear to be more obstacles on the market than can bridge, so that is where I shall concentrate.

Games Compendium from Salamander Software contains six games. Donkey Derby is similar in concept to Horse on a previous Dragon Data cassette, but has more entertaining graphics. If your steed falls, it lies there with its feet in the air! The game also allowed me to win much more than in real life. The second game, Kingdom, is a management simulation of ruling a country. I did not get on as well as on the BBC's demonstration tape version, but this probably says more about my skill in governing than the quality of the program.

Blaxxage is the American form of Romain, a card game where you try to get a hand worth 21 points. The graphics are reasonable, and the game seems fair, so I don't feel the computer cheated all the time! Hunt the Wampus is such an old computer game, it probably has its origins in valve-driven mainframes. You need to explore a cave system seeking this strange animal, the Wampus. The computer will tell you if you are getting close and you may fire crooked arrows into the cavern that is his lair. If it's the wrong cave, you may get the arrow on the rebound, if you stumble into his cave, you are eaten — with gusto! Not as addictive as an adventure game, but still a pleasant diversion.

The cassette also contains Houghts and Crosses and Lunar Lander ( joystick required). Although no new frontiers are crossed, the cassette is competently written, reasonably documented, and fairly idiosyncratic. As with all Salamander software, the cassette comes in a little library case similar to a video cassette holder. ▶

the best records as you try to win a reputation

and gives you clues as you attempt to guess them. Four is a version of Connect Four, which is itself a larger version of noughts and crosses. Horse is a gambling game (in which the computer cheats — I'm sure it does!). Simon is the familiar colour/sound memory game. This tape is good value and even invites you to list the programs in order to discover how the various effects are achieved, so can be used to learn more about the workings of your Dragon.

Graphic Animator uses pythicks to design shapes and pictures on the screen. There is an option to save several pages of graphics and to flick them through quickly to produce an animated effect. This is an interesting cassette, but needs practice to control the movements.

Personal Finance contains three home management programs, Family Budget, Family Accounts and Family Address. The names are self-explanatory, and the programs utilise the excellent file-handling capabilities of the Dragon. Once the main program is in memory, different files can be selected, sorted, changed, deleted etc., and the new version stored for later use. The documentation, as with all Dragon Data software, is clear and well-written, and the tape is good value if you want to

exploit the serious side of your Dragon.

Special Selection 2 also uses the file system to manipulate a database. This program is better than some costing twice as much — even without considering the other programs. It allows you to set up your own database and to put the entries in order, not just in the first field, but in all the others. This means that if you used the system to store names, addresses and telephone numbers, you could sort the file into alphabetical order of names or addresses, or even in the order of the phone numbers.

Of the other programs, Music uses the screen as a sheet of manuscript upon which notes may be written. The tune can be played after completion and stored on tape if you fancy your chances with a new Eurovision song winner. The version of Hangman is extremely tedious — choosing a large Dragon is no substitute for the cat's paw!

Computavoice is very good value. It allows you to output speech from your television. This has to be entered carefully using phonemes, or sound blocks. If you enter the words as they are spelt, the result is awful, but if you experiment with the instruction book in hand, it is quite simple to make your Dragon offer a friend-

• For a selection of games, it is good.

Another offering from Salamander is *Qash*. The simulation is as close as the Dragon will allow and includes such features as choice of club and strength of shot. The course is shown as a plan, with the various features colour-coded so as to help in choosing options. Just to help the atmosphere (and destroy your nerves) there are additional bits of reality, such as bunkers, trees, wind velocity and direction that tend to interfere with your game.

The graphics are adequate, and this version compares well with others on the market. I think I still prefer the outdoor version, but Salamander's version would do well on rainy days. It still into the nineteenth hole.

Hangman is one of those parodies that is easy to adapt for the computer and that software houses issue when they can't think of anything better to do — at least usually.

Superhangman from Salamander seems to have had some thought and effort put into it. There are three skill levels depending on how much help you want and a vocabulary which won't be quickly exhausted (the computer has a thousand words stored in its memory).

More than that the high resolution man whose life depends on your skill is convincingly there and a timer ticks away the last seconds of his life as you try to win him a reprieve. All in all, if you haven't got it already this looks to be the version to go for.



MC LaMotte produces a game called *Samurai Warrior*. This is similar to *Kingdom*, as it is a game where various choices are available to you, and the outcome depends partly on wise choice and partly on luck. The location is old Japan, and you are among a band of Samurais hoping to achieve a good score. This can be obtained through fighting other Samurais, defeating helpless villagers, or by commit-

ting *Seppuku* (the Japanese word for ritual self-sacrifice).

Although the concept is a little gory, the game is interesting and well thought out. There are some graphics — *Samurai* versus *bandits*, for example, but it isn't as exciting as a *Kurosawa* movie. I enjoyed the novelty of the game, however, and it certainly made a pleasant change from run-of-the-mill settings of most games.

It is fairly clear to anyone entering a store like W H Smiths that the quality of software packaging is improving all the time. Although this is pleasing to the eye, the contents do not always live up to the expectations conjured up by the superb artwork. It is also true that some excellent programs slip by unnoticed when they are concealed in simple covers.

*Minotaur* is a case in point. Some of its software is beautifully packaged but proves disappointing, while the least flashy conceals originality. *Alcatraz* II shows a fugitive from a Minotaur on the cover, but in order to reach this stage you must negotiate prison guards and towers. This sounds quite inviting until you realise that the game uses low-resolution graphics and, being written in Basic, does not have the speed of a machine-code program.

The concept of the game is interesting but the result is merely average. From the spelling and the fact that the instructions are in a short separate program, it seems possible that *Alcatraz II* was designed for use with the Tandy Colour Computer.

*Planet Invasion*, again Microdwarf's, ▶

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• Has a gaudy sleeve. This time, the book can be judged from its cover, as this game is a competent version of Defender, complete with smart bombs and high-speed machine-code action. The scene is set rather differently, in that "certain crystals" rather than small people are being lifted from the surface of the planet, but the rest of the game should satisfy any Defender addict who wishes to play at home. This game originates in the United States, according to the copyright information.

Microdeal's Ultimate Adventure-4 comes in a rather plain cover but inside looks an entertaining adventure. The locations leap from Arctic wastes to jungle with incredible rapidity, but the program was written by someone with a sense of humour, and is reasonable for a text-only game. It is written in Basic, but this is fast enough for this type of program. My only serious quibble would be with the atrocious spelling — I counted eight mistakes in the instructions alone ("obstacle" being one of the more amusing). This is a high number for a finished product and spoils an original game.

Donkey King is the last from Microdeal and it is a "Dragonized" version of an American original written for the Tandy by Tom Ma. This cassette contains not one but three versions of the arcade game whose name differs only in one vowel. True enough the only difference is that of the background/foreground colours but if you choose black and white the resolution is noticeably higher.

When I came to reviewing straight arcade copies the main criterion must be "how good is this version?". This one lacks the aged goria threateningly shaking the bars but does have feedback and a helplessly screaming Fay Wray.

Despite a practice option I failed to rescue the girl and was regularly crushed to death by barriers and/or festivity. Written in machine code, the game is fast enough to be addictive and I found that one humiliating failure was quickly followed by another as my finger, acting against my better judgement, insisted on another go.

Forbidden City is an adventure game from Apex Trading of Brighton. The object, as always, is to amass as much treasure as possible without falling foul of the unpleasant things that lurk within the walls



of a city. As adventure games go, it was not particularly impressed. It is purely textual, which means that the descriptions have to be inspiring, amusing or original and here they are fairly adequate. It is fun to play, but not really in the addictive class.

Cassette Two is the unimpressive title of a collection of games from Video Productions. The tape seems to be good value in that it contains an index as well as six programs. They are, however, very short, and the graphics are the feeblest possible. With the potential of the Dragon for excellent displays, one wonders why programs should be produced using maths symbols to represent spacecraft. This gives the games the feel of something written for the ZX81. Luckily, the programs improve slightly towards the end of the cassette. Although they are fairly idiot-proof, most users could write comparable games — so why buy this cassette?

Games Pack Two, from Gem Software, contains four games. This collection is far more varied than the last and is far better value. The first game is a flight simulator that enables you to attempt a landing provided you have a pair of joystick. "Attempt" is the operative word as it is not

an easy task. There are no graphics, and the instrumentation is rudimentary, but it is unusual to find so challenging a game amongst a collection.

Hangman, the second program, is a reasonable version with the words stored in data files, so the program could be altered to contain your own words in a classroom or at home. This is a lot better than the Dragon Data version. The third game is called Speed Boat, the object of which is to race down a river bursting balloons; nothing out of the ordinary, but quite entertaining.

Ship, the last in the pack, is a version of the co-ordinate guessing game, Battleships. You have to discover the position of the computer's hidden ships, and if you are successful, there is a display of the unfortunate ship being hit. My criticism of this game is that the co-ordinates have their origin in the top left-hand corner, and the "y" value has to be entered before the "x" co-ordinate, which goes against the accepted conventions. Apart from this, it is an exciting game, and completes a tape that represents good value for money.

To complete this selection, there is a financial cassette from Hilton Personal Computer Services — Personal Banking System. This cassette contains enough functions to allow you to check on your own bank account. It is menu-driven and can support separate data files. It comes with standing orders and corrections to entries as well as printing statements which you can compare with the bank's.

It could be used by a small business to check individual accounts, but this might be risky — I managed to crash the program twice by entering values outside the permissible range. A program with any business potential would not have allowed me to do this.

To sum up, it seems that there is still room for innovative software on the Dragon. Six months ago, Dragon Data released its first batch of programs, and this is still able to hold its head up in the software marketplace. Of the cassettes and cartridges reviewed here, there seems to be a tendency towards over-charging for products that rarely rise above mediocrity. If the quality of software is not improved, more people will write their own. Ultimately, of course, this would not be a bad thing.

## Software packages reviewed this month

Game	Company	Game	Company	Game	Company
Get Out Games Compendium £1 £7.95	Salesmaster Software 27 Gillingham Way Brighton BN1 4DL	Game Pack 1 £7.95	Gem Software Unit 0 The Mallings Southborough Herts	Games Materials Astronics Cosmic Invaders Starship Chameleon Cave Hunter Barnes £11.95	Dragonized — available from retail (prices shown are recommended only)
Forbidden City £4.95	Apex Trading 115 Chestnut Drive South Brighton BN2 4BB	Cassette 1 £5.95	Video Productions 31 Denner Road Kewford Cheshire	Special Selection 1 £24.95	
Personal Banking System £8.95	Hilton Computer Services 14 Anston Road Oxford, Ox4	Planet Invasion Astrobit II Ultimate Adventure Donkey King All £8	Microdeal 41 Thorn Road St Asaph Gwynedd	Special Selection 1 Orpheus Anniversary Personal Finance Special Selection 2 Computational Quest Madness and the Minotaur All £7.95	

# GEN SOFTWARE

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The Dragon is one of a new breed of computer designed to last a long time, making it ideal for serious use as well as games.

## And in the red corner, we have the Dragon

*For some people there is always that nagging doubt. Did I buy the right machine? Or, as is more often the case, was I given the right machine? Boris Allen reviews popular home computers.*

IT IS NEVER possible to buy the best computer, because such a machine does not exist, cannot exist. The answer to the question "Is the Dragon the best computer for me?" is also equally unhelpful: the answer is "Perhaps, it all depends. . . ."

There are quite a number of competitors in the race to produce a cheap, versatile, microcomputer, and, as it is difficult to evaluate any computer in a vacuum, I will try to see how the Dragon 32 compares with three other "name" computers.

The three computers I have chosen to compare to the Dragon are the ZX Spectrum, the Commodore Vic20, and the Acorn BBC Computer; and they have been chosen to exemplify different styles of computing, and different philosophies of design.

A computer can be designed down to a price, that is, the manufacturer starts out with a price, and then builds a machine which can be sold profitably at that price. The Sinclair machines are examples of this "built to a price" philosophy: it is obvious that the prices of £125 and £175 were fixed well in advance of the machine, before it was built, because that was what it was felt that the market could stand.

Another example of the price-dominated

mentality of Sinclair machines is the £50 compact disc promised when the Spectrum was launched: the disc has not yet been launched (we do not even know if it is a disc) but it is still priced at £50 — though the disc is now going to have a device to attach it to the Spectrum at some extra cost. The disc price has remained constant, the price of attaching (and therefore using) the disc seems to be increasing.

The Spectrum was also sold for quite a time by mail order only, and this, again, shows the "money at all costs" mentality. There are an untold thousand and one stories (plus) about long waits for the Spectrum, and advertisements being produced offering the Spectrum within 28 days when many people maintain that there were no Spectrums in production.

The BBC computer is, unfortunately, tainted with the same brush: sold by mail order, with no machines to support the advertisements, though in the case of the BBC there were a few in specialist shops. I say "unfortunately" because the BBC computer was built to a specification, and not mainly to a price.

The specification of the BBC computer is very good, and shows the influence of the accent on the specification being greater

than the accent on the cheapness of the computer — though it is an unrealistic manufacturer who ignores the importance of price. It is also an unrealistic manufacturer who ignores the specification to concentrate totally on price.

If a manufacturer is willing to take money on the basis of a promise for the future, we should be wary.

The Vic20 was never sold by mail order; it was sold at first in specialist shops which were Commodore agents, and later in less specialist shops in the High Street. By the time it was introduced into the UK, the Vic had been on sale in other countries, and the Vic was notable for the general lack of bugs when it was first introduced.

The Vic was the first low price colour microcomputer of any importance, and when it was introduced in 1981 it was priced at about £200. This now seems to be quite a high price, and — as the profit margins on computers seem to be rather high — when the Spectrum came along to undercut the Vic, the Vic's price took a drastic fall (as did the price of the ZX80).

How does this compare to the history of the Dragon? The Dragon was notable for being one of the first of the newer, cheaper, computers not to offer itself for months

before its appearance as "available within 28 days" by mail order. (The Vic was probably the first.)

The Dragon was released only in shops, and in quantity; the Dragon appeared in many non-specialist outlets, but to assure a proper back-up it is still wise to try to get a Dragon from a specialist store.

The BBC and Spectrum are similar in that both relied on postal sales, and the Spectrum is notable for relying upon mail order repairs. Depending upon the mail, as they do, might explain why both Sinclair and Acorn seem so slow at communications. The Vic, Dragon, and BBC, can all be repaired in-house by specialist suppliers, whereas the Spectrum is a Sinclair problem.

If the Vic and Dragon are not supplied by specialist retailers, then they too have to be sent away — sometimes the same is true of the BBC.

## Different philosophies

I have spent some time on the boring subject of support and sales technique because quite often such things and up being very important: support, and the way the computer is sold, tend to give valuable clues about the nature of the computer's manufacturer.

The philosophy behind each computer is made obvious in many different little ways: the type of keyboard, the container which holds the computer, the type of language, the potential for expansion, and other similar considerations.

Once we start looking at these characteristics we can begin to learn about the Dragon, what it can do, why it can do it, what it is capable of doing.

Start with how a user will approach each of these machines: which of these machines is the most "user-friendly" at the outset, especially for a total novice? The answer has to be, without doubt, the Spectrum.

The most important consideration in the design of the Spectrum (apart from being cheap) would seem to be the initial ease of use. The Spectrum has a form of Basic which is easy to learn, and does not require the ability to spell, because it uses keywords (one key only is used to produce Pict).

The Basic has simple graphics commands, which make complicated appearing figures able to be drawn with ease (as long as one only uses one ink colour).

A computer which is very easy to use at the outset, is not always a computer which is easy to use when one wants more demanding things. All the three other computers have proper keyboards, though at the outset it might be more difficult to remember how to spell Print (or that on the Dragon colour is spell Colour) ultimately it will be found that keyboards are very restrictive, and that the dirty touch-sensitive keyboard on the Spectrum is a pain.

If a computer is designed to be easily extended, then it must have a moving-key board, and not have to depend on private suppliers to produce proper keyboards. An industry has grown out of the deficiencies



The BBC Model B — problems upgrading from Model A to Model B



The Sinclair Spectrum has the most built-in potential for extension

of the ZX81 and Spectrum. Of the three proper keyboard machines, I have found that the nicest keyboard is that on the Vic, though none of the three is poor.

When we move to the languages available on the machines, at one end is the Spectrum and Vic, and at the other end is the BBC and the Dragon. Though the Spectrum (like the BBC and Dragon) has special graphics commands, the language as an entirety is limited, and the Vic (though a colour computer) does not have in-built high resolution commands — though by buying a special Rom pack it is possible to add such commands to the language.

With the Spectrum it is almost impossible to add new commands, partly because of the extreme dependence on Sinclair Basic upon the use of keywords.

Both the BBC and the Dragon use extended Basics and the languages have potential for expansion. The Dragon's extended Basic is not as powerful as the BBC Basic developed by Acorn, but given the content of most of the books published so far about the BBC computer the power of the BBC's Basic has not been recognised or used.

Where some of the books on program-

ming for the Spectrum and Vic are pushing the use of their Basics to the limit, in the case of BBC and Dragon books this potential is still dormant. As the BBC and the Dragon are both more complex machines, the manufacturers themselves are probably not aware of the full potential of their own machines.

As the Spectrum and Vic are inherently simpler machines it is far simpler to cover a larger area of knowledge about the machine; this is partly why the manual for the Spectrum is so much more comprehensive than most other manuals. One has to be very keen to get beyond the information in that manual.

The same is true, but less so, for the Vic: the Vic developed out of the Pet/OSM series of machines, and that Basic has been very successful over a series of years. When a colour graphics language is developed it makes sense to try to develop special graphics commands as part of the language, and the Basic for the Vic did not make sufficient movements towards graphics, eg the lack of high resolution graphics commands.

BBC Basic is, as I have noted, a potentially very powerful language — used to its potential — and though Dragon

Basic is less powerful in some respects, some of the facilities on the Dragon are superior to those on the BBC.

Commands such as Play, or Conté (which can also draw ellipses) are very helpful, though setting up a loop to play the same tune at all 255 different speeds is very wearing on the ears.

A rather surprising omission in the Dragon's Basic is the lack of a facility for forming user-defined characters (a facility available on all the other three colour computers). David Lawrence (Chapter 5 of *The Working Dragon*) gives routines to overcome the deficiency.

In terms of the loading and storing of the Basic (programs you have written), the Vic and Spectrum come out best — possibly because both are designed for the other device, or possibly a variation in emphasis. The use of cassette recorder on both Vic and Spectrum is easy, though easier on the Vic than it is on the Spectrum (because with the Vic one has to buy a special Commodore cassette recorder).

On the Dragon and BBC the connection between computer and cassette recorder is by Dinplug connected to three jacks; it is possible to control the cassette recorder from the computer (as is possible with the Vic). The Dragon's commands Motor On and Motor Off are useful extra facilities; on the BBC you have to pull out the Floppy Jack.

For somebody such as myself, I find the availability of the Tron (trace on) and TrOff (trace off) to be highly useful. Tron outputs



The Dragon — its strip strips

on the screen the number of each statement as it is encountered within the program. Again, as a person used to more sophisticated systems, the number command in Dragon Basic (Ranum) is very helpful; these are the type of commands normally provided by tools which are sold as extras on other computers.

In the case of the Vic and Dragon it is possible to play in cartridges which run instantly when the computer is switched on. The use of cartridges means that the Basic system is frequently switched off,

and other languages can be used with the least difficulty: to load a language and compiler into Ram uses up space, and thus restricts the room available for programs.

On the BBC computer it is possible to insert Rom chips, with its gauges or utilities such as word processors, but this is rather more tedious, and less flexible (and more likely to lead to bent pins on chips). The Spectrum has no facility (in the design) to use Rom-based languages and utilities.

The potential for improvement for the Dragon is greater than the potential of the other basic machine in the case of the other three computers. The reason why this is so, is that the microprocessor for the Dragon is the Motorola 6809, whereas for the Spectrum it is the Zilog Z80, and for the other two it is the MOS Technology 6502.

Over a wide range of benchmarks, running machine code, the 6809 was upwards of 1½ times faster than the Z80 or 6502; and 6809 Unix Pascal (Pascal, like Basic, is a programming language) was only 1½ times slower than a Z80 using assembly language. (See *Micro-Journal* Vol 3 (4)).

The Dragon is, then, a potentially powerful machine; if it is possible to use a common language such as Pascal, and be only slightly slower in running than a machine code program on other computers, this gives the user great power. It is far simpler to write a program in an ordinary language such as Basic (or Pas-

## Wizard Software FOR THE DRAGON 32



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call) and takes much less programming time, so that if the resulting program is not that much slower there is no need for writing in machine code.

When we talk about the basic machine, we realise that few computers ever stay as the basic machine, and become extended in many directions. An important point to consider is thus the ways in which a computer can be extended.

The computer with the least built-in potential for extension is the Spectrum, and that with the greatest potential is the BBC Computer (Model B). At the moment the computer with the greatest range of peripherals is probably the Vic, partly because it has been around for the longest, and partly because it was designed to use many of the peripheral devices available for the ProDIM series.

Though many private firms have produced extras for the Vic, Vic owners are encouraged by Commodore to buy Commodore peripherals — starting with the obligatory serious cassette recorder. In terms of its initial design, though, the Vic is limited.

Considering that the Spectrum has now been with us for quite a time, there has been little produced to expand its potential. By "expand its potential" I do not mean the production of proper keyboards, or sound boxes to amplify the Spectrum's tiny speaker, but items such as discs. Most of the extension of the Spectrum can be seen to be to remedy deficiencies in the original Spectrum: buying a soundbox and keyboard (so try to obtain the facilities of the Vic or Dragon) will bring the price above £200, mind you, to increase the size of memory on the Vic to any decent amount is also going to be expensive.

## Moving up

One thing there is for the Spectrum, and games games; however, for how long will the Spectrum be Sinclair's main machine? Will there be any easy way of upward compatibility? (Tandy's TRS-80 series are very good at assuring upward compatibility.)

The BBC has the greatest potential because it was so designed, but even then there have been problems with the upgrading from BBC Model A to Model B. With the upcoming "Tutor", the BBC computer will be able to use other microcomputers (such as the Z80 or 6800, or the NS16050) as well as other devices. The BBC was produced before the Spectrum appeared, but it is only now that discs have become readily available. The BBC is a proper machine designed to be of use for quite a few years; the Spectrum, one feels, is not intended to have such a long life: though some think that the ZX81 is a disposable computer, the Spectrum is still too expensive to have reached that stage. How long will the upgraded last?

The Dragon is one of a new breed of computer, computers which are not designed to be this year's computer, but designed to be of longer validity. On these grounds alone, of the four machines I could only recommend the BBC or the Dragon for anything which pretends to be



increasing memory size on the Vic is expensive a serious use. So how have I found the Dragon performs when I am using it?

I hate computers without an On/Off button, I find something primitive about having to unplug everything, or to pull out the jack, so I was pleased to discover the button at the rear. I was also pleased to find that (unlike Acorn computers) I did not have to buy a lead to connect my computer to the cassette recorder. I like the reset button, as well as the break key, and was glad that when I reset the system I did not lose my program (to be recalled by On, as has to be done on the BBC). Switch on and wait.

I get the heading, and start typing: nice feel to the keyboard. No lower case, pity, it can't start up printed output quite nicely, but who really cares? The colour display after a while and goes, and I wonder if this is anything to do with the fact that the sound comes out of the television speaker. The reason why I wonder this, is that the same happens on my television when I use a Vic: the Vic also sends sound to the television speaker.

The problem is definitely due to my television because I have used Vics which are well-nigh perfect on other televisions, but they collapse into black and white on mine. The colour of the Spectrum and the BBC is always good on my television, and both these have internal speakers (and little else in common).

Having made my first mistake, I have an error message: an incomprehensible Y&M at line something or other. Looking at the list of errors I find I have made a syntax error, and given time I expect I would be able to decipher most of the error codes at sight; and as there are 24 errors which can be reported I reckon that error-reporting is quite good. But what was the error?

I am used to typing in programs whose spaces are not significant (as spaces between letters do not matter). Searching through the Dragon manual I could not find where it was explained, but it seems that in Dragon Basic, spaces are sometimes needed, and sometimes they are not — my error seemed to be in a For loop. It took quite a time before I realised that this was

what was producing the error, and the manual did not help greatly here.

Heading the section on For Next loops (p. 16) I come across the interesting line 20 FOR=LASTLOC where it was not too clear where there were spaces, and the "10" part of the statement was printed as "to".

What the Basic interpreter was doing was taking a line FOR=NTOM as equivalent to FOR I = NT with the rest of the line missing (Dragon Basic thinks that the variable NTOM is NT, it forgets all letters after the first two). This should be made much clearer.

The Dragon is in good company (eg the Acorn and the IBM Personal Computer) in being fuzzy about spaces, but it should be made clear. What makes it more complicated is that sometimes spaces do not matter.

As a machine the Dragon has great potential but to use that potential the manual should have some explanation of how memory is set out, and to find that out needs reference to the four tables called "Additional information". Even then the information is fairly uninformative. A further useful item is a list of useful locations, such as those in the helpful sections of the Spectrum manual, or those in the Apple II documentation. Others, to it be hoped than myself, found the manual quite helpful (but in time ...).

Having to edit out my syntax error, once I had found what it was, came very easily with the Dragon's Edit command, and after some experience with the editor, I was very impressed. I was also very impressed by the need for a repeat key.

With the BASIC chip being the best I feel ship available, I am looking forward to trying out languages such as Fort, which are perfectly suited to the ship's power and capabilities. All in all, the Dragon is a machine with potential as well as present attractiveness.

## Acknowledgements

I would like to thank NSC Computers, 29 Hanging Ditch, Manchester M6H 6JZ 2078, for their help, assistance, and advice.

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John Syms: "A good Dragon program could be converted to Tandy and marketed in America—the royalties could be considerable"

FOR TWO COMPUTERS that appeared in significant quantities at approximately the same time it is surprising how different is the state of the software markets for the Spectrum and the Dragon 32.

The long established ZX suppliers took only a few months to get to grips with the new machine and began to produce interesting new programs that made full use of its potential.

Despite being well received by the computer press and being the one big sales success of the parent company Mafco, the software market for the Dragon has been both small and unimpressive.

Many of these who bought their Dragons at Christmas and who are not yet skilled enough to write their own programs were disappointed.

One of the companies trying to transform this situation is Microdeal, a St Austell-based software house which specialises in Dragon software.

Microdeal began as a one-man operation with company director John Syms distributing Tandy Colour computer software from home. We decided to take on a new computer and the Dragon sounded interesting," explained John.

It is tempting to suppose that just as Spectrum software could develop naturally from the ZX81 so the Dragon could depend on the constantly emphasised link between itself and the Tandy as a similar basis for development. According to John this link is even tighter than first, certainly a good deal of conversion is required. "Ninety-nine per cent of the material for the Tandy colour won't work on the Dragon."

## Microdeal fills software gap

*Software Editor, Graham Taylor, talks to John Syms of Microdeal, one of the first firms to develop a full range for the Dragon 32.*

This is a task important to John since at the moment nearly all the games for markets are converted from Tandy originals.

Apart from the technical difficulties there are other problems. It certainly isn't a question of converting everything available for the Tandy in America into programs for the Dragon over here; there are important differences in the markets.

"In a way we're selling an American product to English people, it's important to remember that American programs are written for American tastes — they don't like complicated adventures for example and are very much more ad-on minded."

"There are a lot of things like Ram packs for programming Droids that we could adapt from the Tandy but the market isn't interested."

It was again a question of adapting a Tandy original with their first significant series program the "Telewriter" word processor; John is very proud of it. "Telewriter is our first-ever business program; it proves the Dragon isn't just a toy."

Although the "Telewriter" looks like being a success, it seemed to imply emphasis the question I implicitly raised at the start: "Why do we have to rely on a converted American original —

where are all the British Dragon programs?"

John shrugged his shoulders: "What little we've seen in Britain just hasn't been good enough. I think it's partly because the 6809 is an unknown processor over here; those who understand machine code have often learnt it in college — that usually means a 286."

John also lost part of the blame squarely on Dragon itself. "Dragon has been so helpful whatever to any of the software houses, they didn't even tell us they had reconfigured the Ram — it meant we had to withdraw two games."

"People bought games after playing them in the shop but found they didn't work on their machines at home — naturally they assumed the machine was at fault — it must have cost Dragon a lot of money in unnecessary repairs."

Whatever the initial setbacks Microdeal is now doing well, although John was reluctant to go into details: "Let's just say we are meeting the market demand."

Microdeal currently has four staff and may take on more to cope with the demand. "Up to a month ago it was virtually turning from home but we needed to get a 24-hour turnaround."

John was keen to stress the

importance he places on speed. "Orders on my desk by now were packed and ready to go by thirty. To be honest mail-order is a pain with all the time it takes up but it's necessary until the dealer network builds up."

Now that Dragon software is starting to be produced in substantial quantities building up a reliable dealer network is obviously a major objective but it has to be done carefully. "We won't let just anyone sell our stuff — people have to be able to get the correct back-up advice and information — most prospective distributors are turned down."

His concern that as the fledgling market is developing the interest should be protected is reflected in his uncompromising attitude towards software pirates. "We don't let them have anything — how can the dealers survive if we do?"

Perhaps as a sign that British programmers are finally waking up to the potential the home-grown machine represents, Microdeal is soon to produce its first games from a local programmer — a version of backgammon utilizing a light pen.

Certainly John hopes it's only the beginning. "It isn't our choice that I'm paying thousands of dollars in American royalties I'd much prefer to see British programmers getting their act together."

"If anyone has got a decent Dragon program then it's crazy not to do something with it."

"Remember the whole process could work the other way, a good Dragon program could be converted to Tandy and marketed in America — the royalties could be considerable."

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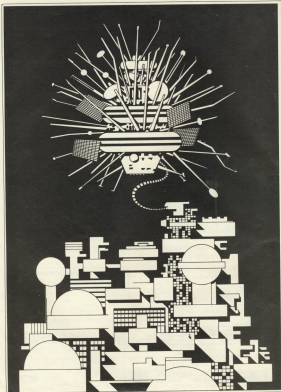
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# Landing on the lunar hover pad

David Windle introduces a new game for the Dragon 32 which uses the high level graphics commands to draw the lunar landscape.

IMAGINE YOU ARE a pilot on an earth mission to Saturn. It is a mission that has gone badly wrong. A fire on board the Probe Mother Ship has wiped out all but a handful of the crew. You have managed to get the survivors into the one serviceable shuttle, which has taken three months to get you back to lunar orbit.

Your problem now is to land the shuttle on the Hover Pad at Moonbase Alpha. The three-month journey has left you with only 200 units of fuel. Your navigator has got you across millions of space miles to within 50 miles of the lunar surface. Now you find that the low level hovering navroom has been damaged. The landing will have to be manual.

You are not sure of the landing tripod and have been advised to use the emergency hover pad at Alpha built in the early colonisation days. This pad holds the ship a few feet above the surface so mending damaged ships to off-load passengers and cargo through extending umbilicals.

On reaching a predetermined height above the pad the ship is locked into position, held within a powerful magnetic field.

There is a moderate solar wind blowing your shuttle down-range from the pad towards the insupportable moon peaks. If you should run out of fuel you have just one chance. If you can hit the exact button in time the survival capsule will blast away from the shuttle and you will be back to square one with another 200 units of the fuel to use.

If you are not quick enough or miss the exact button, well...

## Program notes

This program uses the high level graphics to draw the lunar landscape and uses many of the other functions available on the Dragon.

Line 140 draws the shuttle at the foot of the screen.

Line 190 gets it and 300 puts it in position at the start of your descent.

Line 350 uses the `point` function to detect a crash landing, whereas line 370 draws the magnetic field around the pad.

Line 520 displays the manual when it says that the Dragon will only print text in black on green (or vice versa).

Moonbase Alpha was submitted by D. Windle of Nevens Road, Rayleigh in Essex.

```
10 "MOONBASE ALPHA COPYRIGHT D. E.
WINDLE, 1982
20 CLS:FOR C = 224 TO 255:Y = 0
30 PRINT@C, CHR$(150):NEXT C
40 PRINT@256, " MOONBASE ALPHA "
50 FOR D = 288 TO 310
60 PRINT@D, CHR$(150):NEXT D
70 PRINT@320, " COPYRIGHT D. E. WINDLE
1982 "
80 PS = "T255:95:CCDDEEGGAFAABBAACC"
:PLAY PS + PS + PS:T = 0
90 FOR T = 1 TO 2000:NEXT T
100 CLS:PRINT@163, " YOU ARE THE PILOT OF A
LUNAR SHUTTLE. YOU HAVE TO LAND YOUR
SHIP ON THE PAD ON MOONBASE ALPHA.
YOU HAVE ONLY 200 UNITS OF FUEL. GOOD
LUCK. PRESS 'S' TO START DESCENT "
110 PRINT@385, "CONTROLS 'U' = UP 'R' =
RIGHT "
120 SS = INKEY$:IF SS = "S" THEN 130 ELSE 120
130 PMODE 4,1:PCLS:SCREEN 1,1:COLOR
0,5:DIM R(16,16,)
140 RS = "BM110,177:U3E3R4F3D3G3BL
4H3R4BR2R4U3L4BL2L4D3F3G3R2
BL4R2E3R1BR2R1F3R2L4"
150 LS = "BM0,170:U5R4R6R3F8R20
U14E4R45F5R20E7R10F5R2F9R130
22R35U25E20"
160 BS = "BM0,165:E7R2E9F12R2E8F
4R2E6F4R2F4R2F12E15R3E5F5R2R1E4F6
R3E8R2E7F12E9F12E4R2E7F6D3F16D2"
170 HS = "BM206,147:R35D45L35U45"
180 DRAW RS: DRAW LS: DRAW BS
190 GET(103,169) - (127,193),R,G
200 Y = 15:X = RND(200)
210 "FUEL SECTION
220 F = 232
```

Continued on page 29

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```

220 DRAW "BM1,0;064H;02LS;04H;0206H
    4LS;0120H;14LH;03L;05H
    05R;0206H"

```

```

240 LINE (32,3) - (F,4),PSET,BF
250 LINE (32,3) - (F,4),PRESET,BF
260 "LEFT HAND DRIFT
270 W = RND(3)

```

```

280 X = X - W
290 Y = Y + 1
300 PUT (X,Y) - (X + 34,Y + 15),PSET

```

```

310 PRINT (0,100),0,0
320 PRINT (250,100),0
330 IF X < 3 THEN X = 5
340 IF X > 250 THEN X = 247

```

```

350 S = Y + 24
360 IF PPRINT(X,Y = 10) = 0 THEN S20
370 IF S = 184 THEN DRAW H0
380 IF S = 184 THEN S40

```

```

390 AS = INKEY$
400 IF AS = "U" THEN Y = Y - 2
410 IF X < 1 THEN X = 2
420 IF AS = "U" GOSUB 480

```

```

430 IF AS = "R" THEN X = X + 5
440 IF AS = "R" GOSUB 480
450 IF AS = "U" OR AS = "R" THEN F = F + 2
460 IF F < 30 THEN S60

```

```

470 GOTO 230
480 PLAY "T50;01;V5;CDEFGAB"
490 RETURN

```

```

500 CLS:PRINT@ 220," CRASH LANDING NO
    SURVIVORS" SCREEN 0,1
510 PLAY "T300;0500D;0400D;0300D;
    0200D;0100D;00D;T100;0100D;
    T50;0400D;T100;0D"

```

```

520 CLS:PRINT@ 220," ANOTHER TRY? (Y/N)"
530 INPUT T$ IF T$ = "Y" THEN RUN ELSE 500
540 CLS:FOR N = 1 TO 1000: NEXT
550 PRINT@ 220," WELCOME TO MOONBASE
    ALPHA YOU HAVE "F" UNITS OF FUEL LEFT":
    SCREEN 0,1

```

```

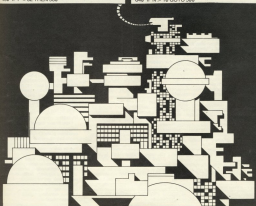
560 PLAY "T600;0P4L30L3D 00R;
    04CDEP4EFL2EL4DOL30C;
    03L20;04L2C"
570 RUN

```

```

580 CLS:PRINT@ 220," OUT OF FUEL.... EJECT
    ....EJECT....."
590 N = 1
600 SOUND 220,1
610 N = N + 1
620 H$ = INKEY$: IF H$ = "E" THEN 630 ELSE 600
630 IF N < 10 THEN RUN
640 IF N = 10 GOTO 580

```



## Getting the most out of graphics

*David Lawrence introduces two of the most underused commands in Dragon Basic, GET and PUT, and shows how the manual put it wrong.*

LOOKING AT THE programs published in magazines suggests that one area where many Dragon users have not really begun to explore is the use of GET and PUT. If that's true, then it's a great shame because in many ways it's these two commands which make the Dragon's graphics capabilities stand out from those of other machines on the market.

Other more basic sophisticated line drawing commands, the ability to colour a limited areas of the screen, the ability to print the same design at a different angle. But how many have the ability to photograph part or all of their own screen for later use? Using G&T and PUT to do just that, the penultimate user graphics procedures that to often be used Basic programs can be revised/developed.

So why is it, at the moment at least, that GET and PUT aren't more prominent in people's programs. Well, almost certainly, a large part of the blame has to be laid at the door of the Dragon manual. Even those Dragon writers who have become used to detecting the inadequacies of the manual will probably not have discovered that when it comes to GET and PUT the manual is not merely inadequate it is a disaster. With the best will in the world, GET and PUT are relegated to the backwaters of programming by the manual for the simple reason that the amount of memory necessary to use the two commands on an area of memory is overestimated.

According to the manual, to store a seven-area of 20-20 Pixels in the highest resolution mode (PMODE 4) requires an array of 20-20 or 400 elements. Since each element in an array requires five bytes of memory, such an array would require some 2000 bytes of memory to store only a standard small object. To store a whole screen using GUT would be a waste (especially on slower 50% or 60% machines, since it would require an array of 100-250 elements, a total of 49125, taking up nearly a quarter of a million bytes of memory).

The largest design from a 32K machine could actually store, with no-Basic programs cluttering up the memory at all, would be about 10000 P-words in size, say 80-75, which that means in practice is that anyone following the Dragon manual's advice on using GET and PUT should first themselves and so, the storage of so more than a few moderate-size designs before running out of memory. For instance, it would seem, to use relatively complex and considerably slower **DRW** commands whenever any considerable area of storage is being dealt with.

The **OF** command does not need anything like one whole array element to represent each node. The **OF** cell has a constant, fixed in the highest resolution mode it currently only 1 bit (right bit to a byte, remember). **OF** cell, when you store to think about it, this is quite typical.

In **PMACIO**, with only two colors on the screen at any one time, all that needs to be remembered about the state of each Pixel position on the screen is whether it is on or off a task for which a single bit is ideally suited since it, too, can only be either on or off.

### Servicing mortgage

In other, lower resolution, PNECDE's the situation is slightly more complex, though the memory saving is even greater. So how exactly does this work out in practice? Consider the following table:

Journal of Management Education 32(1)

PRICE	DIVISION	ARRAY ADJUSTMENT
4	8	5
3	8	5
2	10	5
1	10	5
0	10	5

The table provides a straightforward method of calculating the most economical size of array in which to store a given area of screen. It is used in the following way:

1) Determine the size, in high resolution Poisson, of the area of concern to be assessed.

Thus if the design to be saved covers the top left hand corner of the screen for 50 screen positions to the right and 50 screen positions down (i.e. 5-49 in both directions), its size will be 50-50 (50 high resolution Pixels, or 2500).

The reason that high resolution Pico is also specified is that it does not matter in this case which PMODE you are in. All screen measurements on the Dragon assume on a 256x192 grid representing the Pico positions in PMODE4. Your 64 by 64 area may actually contain 256x192 usable positions (PMODE5) or 12x12 positions (PMODE3), according to the smallest grid available in the PMODE you are using.

2) Divide the number you have obtained by the number in the device column opposite the PMODE you are using. If the result is not an integer number, then round it up to the next highest integer. In the case of our example, a 2500 Pixel area if we were using PMODE 4, 2500 would have to be divided by 8, giving a result of 312.5 or, when rounded up, 313.

19) You have now calculated the number of bytes you will need in order to store that area of screen — you must now calculate the minimum size of array that will contain this number of bytes. This is simply done by dividing by five. Once again, if the number is not an integer, it must be rounded up. Performing again for our example, 313 must now be divided by five, giving a result of 62.6, which rounds up to 63.

4) Having settled on the number of array elements you need, all that remains is to declare a one-dimensional array equal to the number you obtained via the calculations above. In the case of our example this would require an array such as `Array`.

The heart of all this is that an area of screen which would have required, if the advice of the manual had been followed, an array of 80×80 elements, or some 7500 bytes of memory, has been reduced to 60 elements, or some 300 bytes. The requirement for a full screen is reduced to only some 8000 bytes (12000 array elements). This is still a sizeable chunk of memory but not so large that even two or three different screens cannot be stored, if necessary, storable in a fairly substantial program, even in high resolution modes. Quite an improvement on a quarter of a million bytes for one screen.

## In 1992,

Free from many of the constraints of memory, GILL and PUT take on quite a new lease of life. One of the first areas you might like to explore is exactly the one which seemed impossible before, and that is the storage of whole screens of matrices.

Imagine that you have written a game which involves a fairly complex screen design which needs to be reprinted afresh with some regularity. No doubt the original design was set up using some combination of DRAW and PSET commands. This is fine for the initial set-up but it can become extremely tedious if it has to be done, say, often.

These symptoms were observed in the following cases:

```

140 PLOT=0:POLY SCREEN=1.0
150 FOR J=1 TO 5:STEP 2:FOR L=1 TO 255:STEP 2:PRINT (A.11-NEXT J.1)
160 GOTO 150
170 GET (0.0)-(255.128).A.0:SLIGHT FALSE HERE
180 PLOT=
190 IF IMPRINT THEN 150:PRINT KEY TO REINITIAL SCREEN
200 PUT (0.0)-(255.128).A.0:END
210 GOTO 150

```

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```
170 IF IMAGE="" THEN 170'PRESS KEY WHEN READY TO save
180 GOTO "PICTURE",1506,1505+6144,6144
```

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have around 8000 bytes of memory left, is to set up the initial screen and then GSET it into an array. From then on, whenever you need to reset the screen you need only PUT the array back on to the screen. While for a simple design this is hardly worth it, the difference in speed for a complex design is dramatic and can make the difference between an amateurish program and one with all the slickness of a professional product. Listing 7 shows how a whole screen can be stored in an array and later reloaded on the screen.

On occasions, however, you may well be pushed for space. The lines necessary to set up the design in the first place may take up a considerable amount of memory and it may not be practical to add to that a large array, no matter how much you desire to speed up the program. In that case, why not consider setting up the initial design, storing it on tape separately from the program itself, then reinitializing it when the game is played and GSETting it to use in the game — clearing away with the need for all those GRAPH, PSET and PRINT commands in the main program itself.

## Procedure

All that you need to do is to design your wonderful graphics. When it is done to your satisfaction, save it as a block of memory on tape using lines such as those in Listing 2, which are meant to be added to Listing 1.

The three numbers in line 180 refer to the beginning of the memory area, the finish point and the number of memory locations. Provided that you are always starting at page one in the video memory (the figure for the various PMA000s would be as follows).

PMA000	START	FINISH	SIZE
0	1536	5071	1536
1	1536	4687	3072
2	1536	4687	3072
3	1536	7679	6144
4	1536	7679	6144

If you wish to use video memory starting at any other page but 1, then you must add 1536\*(page no.-1) to the first two numbers.

You can now add Listing 2 to the main program. It will pick up the screenful of graphics from tape (it's best to do so immediately following the main program on the tape so that there's less fiddling about). All the graphics commands can thus be omitted from the main program. Not only does this technique allow you to save memory, it's also extremely impressive when you show the program to your friends, with complex graphics appearing out of nowhere in a program which apparently has no graphics commands!

You will note that in these listings I have included the 'G' option in the GSET statements, which means simply that full graphic detail is picked up into the relevant array. This appears to make no difference to the memory demands. There is no apparent hard and fast rule for when 'G' must be included, it is simply that some-

```

100 IF SWCH=7 THEN THEN SWCH=PRESS KEY WHEN SWCH=7 TO SWCH
105 CLEAR PCLS:G3R PC1225)
210 IF SWCH=0 THEN
220 G3R000:PRINT#0-B
230 PMA000:SWCH=1-B
240 GET (B-B)/255,190):A,B
250 PCLS
260 IF SWCH=7 THEN THEN SWCH=PRESS KEY WHEN SWCH=7 TO SWCH
270 PUT (A-B)/255,190):A,PSET
280 GOTO 700

```

Listing 2 — picks up the screenful of graphics from tape

times the program can give some strange results — whether you can leave it out is really a matter of trial and error in your particular application.

You can also omit the PSET option from the PUT statement and obtain a big increase in speed. PSET, PMA000, OR, AND and NOT (discussed below) can all be used in a put statement without the inclusion of 'G' in the GSET statement. Test this for yourself by removing the 'G' from line 100 of Listing 1 and running the program. Now remove the PSET from line 160 and notice the increase in speed.

GSET and PUT are not limited in their usefulness to applications involving the whole screen or even large sections of it. Properly used they represent not only a way to higher speed but a massive increase in the overall graphics capabilities of the Dragon compared to a machine which only has such commands as PSET and GRAPH. Many users have not discovered this because they have yet to see the real relevance of the PUT options, PSET, PMA000, AND, OR and NOT.

The simplest of these options are PSET and PMA000. To include PSET or PMA000 in the PUT statement (e.g. PUT (X1,Y1)-(X2,Y2),PSET or PMA000) simply means that whatever was taken from the screen will be replaced as it was found (PSET) or inverse (PMA000).

Anything which was originally in the area on to which the design is being placed will be obliterated by the design contained in the array in exactly the same way that it would if you were over-printing. In effect, what the two options provide you with is a flexible form of graphics. PSET or statement — flexible (because you can specify down to the last Pixel where the character or design you have stored will be placed on the screen. The PSET option is ideal for simple moving graphics, where the characters do not have to move in front of existing material on the screen.

## Smooth moving

When the character to be used has been defined (probably using DRAW) simply GSET a screen area which contains the character and a margin of blank screen on each side. If you intend to move the character only one Pixel at a time then a one-Pixel blank margin will do. The character can now be moved smoothly around the screen, always obliterating its previous position as it moves.

Listing 4 gives a very crude example of a circle which moves in a straight line across the screen but there is no difference in principle for more complex movement. Changing the PSET in line 160 to PMA000

will illustrate the difference between the two options.

The remaining three options available for PUT really do need to be explained together since it is not so much their individual capabilities but their interactions which make them so interesting:

OR The OR option makes your PUT statement perform in a way very similar to the ORER characteristic on the Sinclair Spectrum. What it does is to superimpose the design stored in the array on to whatever is currently in the target area of the screen. Thus the original screen contents are not obliterated unless the design in the array covers all the pixels that were on (or rather 'set') before it was placed there.

The result is a mix of both what was on the screen and what was in the array, with any Pixel in the designated area being set if EITHER it was set before the PUT statement was executed OR it was set in the design stored in the array. As we shall see, this can be extremely useful where it is desired to move something through or over what is already on the screen.

AND This leaves only those Pixels set which were originally set BOTH in whatever was on the screen before the PUT statement was executed AND also in the design stored in the array. If you were to PUT a character on the screen and then PUT it again in the same position using the AND option, you would see no effect because all the Pixels which are set coincide and thus they all remain set.

If, however, you were to put a small outline circle within a larger one, they would both disappear completely because they share no common Pixels. Usually AND is at its most useful when employed with the next option, NOT.

NOT This may seem a strange one at first, since provided that the array is of sufficient size to cover the screen area designated, what is in the array specified in the PUT statement makes not the slightest difference to what happens on the screen. What does happen is that within the specified rectangle on the screen any Pixel that was previously set is reset (switched off) and any Pixel that was previously reset is set. The contents of the rectangle are thus inverted. At first sight this might not seem immediately inspiring but, together with AND it enables us to perform a very selective erasure from the screen.

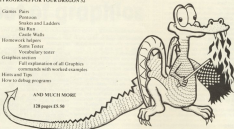
Listing 5 illustrates how an erasure of one design can be achieved without necessarily blotting out another design with which it shares an area of screen. ■

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VOGUE GERMAN.....	CS. 00
TOUCH TYPING.....	CS. 00
TRAINER.....	CS. 00
SHARPLE DODGED.....	CS. 50

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```

100 DIM A(2)
110 PMODE:4.1:POLS:SCREEN 1:0
120 LET DR=DR100,100:U2:E2:F2:F2:G2:L2:H2:ORAH DR
130 GET (99,99)→(107,103):A,C
140 POLS
150 FOR I=0 TO 100
160 PUT (I,I)→(I+0,1+0):A,PSET
170 IF I#KEY#="" THEN 170 THIS LINE IS OPTIONAL
180 NEXT I
190 GOTO 130

```

Listing 4— shows a circle which results in a straight line across the screen

```

100 DIM A(2):B(2)
110 PMODE:4.1:POLS:SCREEN 1:0
120 LET DR=DR100,100:U2:E2:F2:F2:G2:L2:H2:ORAH DR
130 IF I#KEY#="" THEN 135 LINES ENDING IN 0 ARE OPTIONAL
140 GET (99,99)→(107,103):A,C
140 PUT (99,99)→(107,103):A,HOT
145 IF I#KEY#="" THEN 145
150 GET (99,99)→(107,103):B,C
160 POLS
170 PUT (100,100)→(100,100):A,PSET
175 IF I#KEY#="" THEN 175
180 PUT (107,100)→(115,103):A,OR
185 IF I#KEY#="" THEN 185
190 PUT (100,100)→(100,100):B,B-0
200 GOTO 200

```

Listing 5— how to erase one design without blotting out another

```

100 DIM A(1):B(35):C(1)
110 PMODE:4.1:POLS:SCREEN 1:0
120 DR=DR100,100:U2:E2:F2:F2:G2:L2:H2
130 GET (100,90)→(100,102):A,C:NB NO BLANK BORDER
140 POLS
150 FOR I=0 TO 200 STEP 10
160 PUT (I,100)→(I+0,100):A,PSET
170 NEXT I
180 GET (10,100)→(200,100):B,C
190 POLS
200 DR=DR100,100:E3:BL:3:F2
210 GET (100,97)→(100,100):C,C
220 POLS
230 FOR I=15 TO 200
240 PUT (I,101)→(I+3,104):C,OR
250 FOR J=1 TO 50:NEXT J:TIMING LOOP TO SLOW IT DOWN
260 PUT (10,100)→(200,100):B,PSET
270 NEXT I
280 GOTO 200

```

Listing 6— provides a small cross moving along a line of circles

```

100 DIM A(1):B(35):C(1):D(1)
110 PMODE:4.1:POLS:SCREEN 1:0
120 DR=DR100,100:U2:E2:F2:F2:G2:L2:H2
130 GET (100,90)→(100,102):A,C:NB NO BLANK BORDER
140 POLS
150 FOR I=0 TO 200 STEP 10
160 PUT (I,100)→(I+0,100):A,PSET
170 NEXT I
180 GET (10,100)→(200,100):B,C
190 POLS
200 DR=DR100,100:E3:BL:3:F2
210 GET (100,97)→(100,100):C,C
220 POLS
230 PUT (10,100)→(200,100):B,PSET
240 FOR I=15 TO 200
250 GET (I,101)→(I+3,104):D,C
260 PUT (I,101)→(I+3,104):C,OR
270 FOR J=1 TO 50:NEXT J:TIMING LOOP TO SLOW IT DOWN
280 PUT (I,101)→(I+3,104):D,PSET
290 NEXT I
300 GOTO 200

```

Listing 7— gives faster and smoother movement for the cross

■ If you enter and run the listing you find that two circles are printed so close to each other that the blank borders of the rectangles containing them actually overlap. They do not erase each other because the second circle is printed with the OR option.

One of the two circles is erased when any key is pressed by the printing over it, with the AND option, of an inverse copy, which was created in line 140 by using PUT and NOT and then copied into a second array. When the inverse copy is placed over the original using AND, there are no set Pixels corresponding, by definition, so the circle is obliterated.

However, all the blank areas in the original design are replaced by set Pixels in the inverted array, so while there is a set Pixel on the screen which is not a part of the design being erased, it coincides with a set Pixel in the second (inverted) array and true to the rules of AND it remains set. Unfortunately if there are any Pixels shared by the two designs, for instance if the two circles had been intersecting, then those Pixels are erased.

## More complex

The problem of erasing designs where they actually overlap others is not always quite as straightforward. Sometimes, it is true, the number of Pixels shared by the two designs is so small that their disappearance will make very little difference but this is not always the case. It is then necessary to repeat the design that you wish to leave on the screen.

Listing 6 shows how this technique can be employed to provide a small cross moving along a line of circles. As that happens here is that the cross is PUT on to the screen with the OR option, so that it appears over any circle in that position. To erase the cross before it moves to the next position, all that is necessary is to PUT the whole line of circles on to the screen again using PSET, which erases the cross. The overall effect is one of motion by the cross along the line of circles and the method can be easily adapted to a variety of applications, especially in games.

Where the design over which you wish to move something is changing, so that you cannot keep PUTTING the same background on to the screen, the solution is to use GET to photograph the area of screen on to which the moving design is about to be placed and restore the background to that state when the moving design has to be erased.

Listing 7 illustrates how this can be done with the circles and the moving cross and shows that the movement is both faster and smoother than the previous method mentioned.

No doubt on first reading this seems to be overly complicated, but half an hour's playing with the listings provided will reassure you that GET and PUT hold no terrors. What they do hold is a great deal of promise that many of us have only just begun to realise. More than that, they provide a timely reminder that while few modern micros do less than their manual claim, the good ones are often capable of a lot more.

# Getting to grips with handling file procedures

*David Lawrence introduces some advantages and pitfalls of learning to use the Dragon's data files.*

ALMOST ANY serious programming on the Dragon will sooner or later require the use of data files; that is the saving of bodies of data on tape so that they can be used later, thus avoiding the need to manually re-enter information each time a program is reloaded.

Data files are also invaluable in developing programs. Since the Dragon unfortunately clears its variables every time a change is made to a program line, a routine to save and reload the variables can be a life saver when the program is being debugged.

At the same time, data files can be one of the most frustrating aspects of Dragon programming for the simple reason that when things go wrong you cannot see what is on the tape to identify the problem. The purpose of this article is to identify some of the major pitfalls in using data files

and to suggest ways of avoiding them. In order to illustrate the methods employed, a specimen data file handling module is included.

One important point before starting to work with data files concerns the control of the cassette recorder through the serial socket.

## A positive pain

No matter what the benefits when it comes to saving space on a tape, the Dragon's control of its own cassette recorder can be a positive pain when it comes to loading or saving data files while a program is running, since the user is no longer able to switch the motor on and off at will to position the tape correctly, without disturbing the program in its operation.

One solution to the problem is, of course, to leave the control line unplugged.

While this is perfectly acceptable when it comes to the loading and saving of programs or during the saving of data, it can cause problems when done during the loading of data files from tape. The reason for this is that in loading data from tape the Dragon will regularly pause to ensure that the data so far accepted is properly placed in the memory before accepting another batch. If the control line is connected then the cassette motor will be switched off during this pause but without the control line the motor continues running and the result can be that some of the data on the tape is missed.

The real solution to the problem is to include in the data file module a routine such as that shown in listing one — it is designed to allow easy positioning of the tape, with the motor on and the contents of the tape relayed through the TV speaker.

```
1000 AUDIO ON:MOTOR ON:PRINT INPUT "POSITION TAPE THEN PRESS enter" (MOTOR IS ON)
1010 PRINT INPUT "PLACE RECORDER IN CORRECT MODE THEN PRESS enter" :GOTO 1020
1020 PRINT:PRINT "FUNCTIONS AVAILABLE: ",
1030 "1)SAVE DATA", "2)LOAD DATA":INPUT "WHICH DO YOU REQUIRE" :GOTO GOTO 1040,1100
1030 RETURN
```

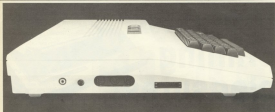
*Listing 1 — designed to allow easy positioning of the tape with the motor on (the C symbol should be read as a)*

```
1040 MOTOR ON:FOR I=1 TO 10000:NEXT I
1050 OPEN "O",E-1,"DATAFILE"
1060 PRINT#-1,N1,N2,V1,V2,V3,V4,V1#,V2#
1070 FOR I=0 TO N1-1:PRINT#-1,##(I):NEXT
1080 FOR I=0 TO N2:PRINT#-1,##(I):NEXT
1090 CLOSE#-1:RETURN
```

*Listing 2 — printing a header for tape handling (the E sign should be read as a)*

```
1100 OPEN "I",E-1,"DATAFILE"
1110 INPUT#-1,N1,N2,V1,V2,V3,V4,V1#,V2#
1120 FOR I=0 TO N1-1:INPUT#-1,##(I):NEXT
1130 FOR I=0 TO N2:INPUT#-1,##(I):NEXT
1140 CLOSE#-1:RETURN
```

*Listing 3 — combining the listings gives a module adaptable for most filing purposes (the E symbol should be read as a)*



One important point before starting to work with data files concerns controlling the cassette recorder through the remote socket.

below the user hands back control of the cassette recorder to the Dragon for either loading or saving.

Before saving data there is another important point with regard to tape handling which is illustrated by line 1340 of listing two — the printing of a header. If you have experimented with storing data on tape then you have probably already discovered that the Dragon is extremely finicky about what is on the tape when it first begins to listen.

If there is irrelevant noise or the improperly erased remnants of some previous file immediately before the specified set of data, an error is flagged and the program stops. For this reason it is vital to ensure that a clear space is placed before each data file on the tape. The length of the header (as dictated by the size of the loop) is a matter of preference but having one as long as that shown has the advantage that if you accidentally begin recording at the very beginning of the tape it will carry you safely over the tape leader and re-data will be lost.

Having set up your tape correctly, the next necessity is to open communication between the Dragon and the cassette recorder (which the Dragon knows under the name of device —1 or —1 for short). This is done automatically when programs are saved and loaded but with data you have to do it yourself.

The file you open can be one of two types, an output file (line 1090) for saving data to tape or an input file (line 1110) for loading data from tape. The file you wish to open must also have a name. If you are saving data then it will be saved under that name whereas if you are loading data the Dragon will not load a file with a different name.

So what can be saved? In fact anything that can be stored in the Dragon's memory, though some of it requires some fiddly reformatting of the specimen module should show that any numeric variable (or indeed a literal number if you like) and any text string can be saved or loaded simply by name, using the format `PRINT#-1` or `INPUT#-1`. The main limitation is that you cannot save non-

```
100 PRINT#-1,LEN(AS):FOR I=1 TO
LEN(AS):PRINT#-1,ASC(MID$(AS,I,1)):
NEXT 200 INPUT#-1,L:LET AS=""FOR
I=1 TO L:READ#-1,CH:LET AS=AS
+CHR$(CH) NEXT
```

Table 1 — how to save a string of graphics characters

standard characters, such as the low resolution graphics characters.

Should you wish to save a string of graphics characters — say a string that prints a design — you must translate each character into its ASCII code, save that number and then, on reloading, translate each number back into a character. The two specimen lines in table one show how it is done.

## Loading

Another point of interest is what is not present in listing three, the loading routine. According to the Dragon manual it is almost obligatory to make use here of the EOF function. This stands simply for End Of File and is a way of detecting the special marker which denotes the end of the data stored on tape. The importance of this is that if the Dragon attempts to read beyond the end of the file it will encounter unintended data and probably stop with an error. EOF can be used to avoid this by including a line such as:

```
100 IF EOF=-1 THEN GOTO 200
```

Just before each group of items is read from the tape. If the end of file marker is encountered, the program execution can be made to jump out of the module which reads the data. This function can clearly be useful in certain circumstances but in most cases it is unnecessary and can hide programming errors. The reason that it is unnecessary is that for the vast majority of programs, the number of items of data of any particular type is, or should be, constantly recorded and updated in the form of variables used by the program.

In the module shown, apart from a few loose variables, the program is storing two

sets of items on tape (the two arrays A\$ and B) and the number of items in each set is recorded by the variables N1 and N2. All that is needed is to save N1 and N2 first and, when the data is picked up from tape, the module will know exactly how many items to read in order to input the whole file.

The reason I say that this is a better way of saving and loading data is that it will automatically highlight any errors in the way that data is being stored. Either precisely the right amount of data is present or an error is likely to occur. Using EOF this can be disguised since, whether or not the correct amount of data is present, the loading will terminate successfully at the end of the file.

It is as well to remember that you cannot load data into arrays that haven't been created. That is to say, it's no use loading your program from tape and then calling up the data file module unless, either in the main body of the program or in the routine represented by listing three, you create with DIM statements all the arrays that once held the data (and which were not saved on tape, it's easily forgotten).

Lastly, when loading or saving is complete, the file you have opened must be CLOSED. The reason for this is that the Dragon can only cope with one file at a time, and failure to close the previous one will result in an error being flagged the next time you try to communicate with the cassette recorder.

The three specimen listings, combined into one module, are easily adaptable for most filing purposes, so without more ado you can get down to the task of applying your Dragon to some serious file handling.

# Dragon's printing pleasures

Keith Brain explains how to make the most of your printer, from control codes to screen copying



THE SEIKOSHA GP-100A is a versatile and popular low-cost dot-matrix printer with the Dragon-type Centronics parallel interface. It can produce both single and double width character and also has a dot-addressable graphics printing mode.

## Printing mode selection

On power up single-width characters are produced but normal characters, double width characters or graphics can be selected by simply sending the appropriate control code (`CHRS(15)`, `CHRS(14)` and `CHRS(8)`, respectively) to the printer by typing `PRINT#2,CHRS(X)`. The new mode will be held until it is countermanded or the printer turned off. If you find no characters print out you have probably sent it in graphics mode.

## Character sets

The GP-100A has four alternative character sets available and you need to decide which one to use. The selection is made by means of an internal DIP switch, so this is really a set-and-forget decision. Most of the characters in each set are the same but twelve differ. Two of the sets produce unusual German and Swedish accented symbols, and so are of little value to the average user. The other choice is between the UK and USA sets, which only differ in that in the UK set the hash sign is replaced by the sign for the pound sterling. Certain other useful characters such as various brackets, arrows and Greek symbols are also available via the appropriate character code.

## Listing Basic programs

The first use of a printer is to make program listings. Typing `LIST` will print out the current program until the program end is reached, or `BREAK` is pressed. The full width of the paper is used (80 columns) and lines automatically wrap round. If you want larger print out change to double-width characters before typing the command `LIST`.

The `PRINT#2,CHRS(8)` command outputs ASCII character codes to the printer and the effects of punctuation are similar to on-screen. If you use this command in direct mode then nothing will print until you press

`ENTER`. If you want to include blank lines on the printer just send the carriage return control code `CHRS(13)`.

## Defaulting

The default print start setting is at the left margin of the paper. If you want to move this to the right you need to first indicate that you want to make a change of print position (by sending `CHRS(16)` (`PCRS`)), and then specify how many character units you want to move with the next two bytes. This data must be repeated at the start of each print line so it is best dealt with in a



FORNEXT loop. Some print formatting can also be achieved by the `PRINT#2,USING` format, output for command.

The test screen memory runs from 1024 to 1639 and you can easily `PEEK` what is on the screen. However, if you try to copy the characters on the test screen to the printer by `PRINT#2,CHRS(PEEK(1024+N))` you may not get the result you expect, as not all the characters are stored in the screen memory of the Dragon as their ASCII codes.

To convert screen `PEEKs` to ASCII characters `PEEKs` between 86 and 136 need to have 64 subtracted. `PEEKs` between 1 and 26 need 95 added to them. It needs to be changed to 32, and `PEEKs` between 27 and 95 print correctly.

That is not as bad as it sounds at first

and a whole screen copy can be produced rapidly by these two lines:

```
10 FOR Y=0 TO 15:FOR X=0 TO 79:  
A=PEEK(1024+X+(Y*80)):IF A=85  
AND A=127 THEN A=A-64 ELSE IF A=3  
AND A=27 THEN A=A+96 ELSE IF A=0  
THEN A=32
```

```
20 PRINT#2,CHRS(A);NEXT X:  
PRINT#2,CHRS(13);NEXT Y
```

A copy routine for the hi-resolution screen is inevitable but is a bit more complicated to achieve. The Dragon hi-resolution screen is mapped differently according to the `PMODE` selected but fortunately the coordinate specifications used are the same for all modes.

To see how the display is produced set `PMODE=1` (`Screen1`) and then `CLS` when you will see a plain screen. If you now `POKE 1536,255` a dark band will appear at the extreme top left of the screen. If you try poking smaller numbers into 1536 you will find this band changes and breaks up. Poking 1537 will similarly affect the narrow strip which is to the right of 1536.

The Dragon hi-resolution mapping system thus sets each screen point as one bit in this mode, moving from left to right, but with the most significant bit on the left. If you `POKE(100,0)` you will turn on the point in the extreme top left corner of the screen (that is the same as `POKE 1536,128`).

The GP100A looks at printing graphics in an up-and-down fashion, rather than the side to side setup of the bits in the screen memory. In graphics mode screen dots are addressed by setting bits 1 to 7 in a single byte, with bit 8 always set. To convert the screen image to printout we therefore need to look at screen position 0,8; if that bit is set then set bit 1 of the first byte to be sent to the printer.

## Moving down

We now need to repeat down the Y axis one point to 0,1. If this bit is set then set bit 2 of the first printer byte. This must be repeated until seven bits have been tested, and then the eighth bit set to complete the first byte.

Fortunately Dragon Basic has `PPRINT` which actually checks the status of each bit on the screen (using the same coordi-



see for all modes) and returns a 1 or 0, but we still need to set the printer box by adding the appropriate numbers to the first byte. The sequence for the first byte is therefore:

```

10 A=PPRINT(X,Y)+PPRINT
20 Y=Y+1:GOTO PPRINT(X,Y+2)
30 A=PPRINT(X,Y+3):GOTO PPRINT
40 Y=Y+1:GOTO PPRINT(X,Y+4)
50 A=PPRINT(X,Y+5):GOTO PPRINT
60 Y=Y+1:GOTO PPRINT(X,Y+6)
70 A=PPRINT(X,Y+7):GOTO PPRINT
80 Y=Y+1:GOTO PPRINT(X,Y+8)
90 Y=Y+1:GOTO PPRINT(X,Y+9)
100 Y=Y+1:GOTO PPRINT(X,Y+10)
110 Y=Y+1:GOTO PPRINT(X,Y+11)
120 Y=Y+1:GOTO PPRINT(X,Y+12)
130 Y=Y+1:GOTO PPRINT(X,Y+13)
140 Y=Y+1:GOTO PPRINT(X,Y+14)
150 Y=Y+1:GOTO PPRINT(X,Y+15)
160 Y=Y+1:GOTO PPRINT(X,Y+16)
170 Y=Y+1:GOTO PPRINT(X,Y+17)
180 Y=Y+1:GOTO PPRINT(X,Y+18)
190 Y=Y+1:GOTO PPRINT(X,Y+19)
200 Y=Y+1:GOTO PPRINT(X,Y+20)
210 Y=Y+1:GOTO PPRINT(X,Y+21)
220 Y=Y+1:GOTO PPRINT(X,Y+22)
230 Y=Y+1:GOTO PPRINT(X,Y+23)
240 Y=Y+1:GOTO PPRINT(X,Y+24)
250 Y=Y+1:GOTO PPRINT(X,Y+25)
260 Y=Y+1:GOTO PPRINT(X,Y+26)
270 Y=Y+1:GOTO PPRINT(X,Y+27)
280 Y=Y+1:GOTO PPRINT(X,Y+28)
290 Y=Y+1:GOTO PPRINT(X,Y+29)
300 Y=Y+1:GOTO PPRINT(X,Y+30)
310 Y=Y+1:GOTO PPRINT(X,Y+31)
320 Y=Y+1:GOTO PPRINT(X,Y+32)
330 Y=Y+1:GOTO PPRINT(X,Y+33)
340 Y=Y+1:GOTO PPRINT(X,Y+34)
350 Y=Y+1:GOTO PPRINT(X,Y+35)
360 Y=Y+1:GOTO PPRINT(X,Y+36)
370 Y=Y+1:GOTO PPRINT(X,Y+37)
380 Y=Y+1:GOTO PPRINT(X,Y+38)
390 Y=Y+1:GOTO PPRINT(X,Y+39)
400 Y=Y+1:GOTO PPRINT(X,Y+40)
410 Y=Y+1:GOTO PPRINT(X,Y+41)
420 Y=Y+1:GOTO PPRINT(X,Y+42)
430 Y=Y+1:GOTO PPRINT(X,Y+43)
440 Y=Y+1:GOTO PPRINT(X,Y+44)
450 Y=Y+1:GOTO PPRINT(X,Y+45)
460 Y=Y+1:GOTO PPRINT(X,Y+46)
470 Y=Y+1:GOTO PPRINT(X,Y+47)
480 Y=Y+1:GOTO PPRINT(X,Y+48)
490 Y=Y+1:GOTO PPRINT(X,Y+49)
500 Y=Y+1:GOTO PPRINT(X,Y+50)
510 Y=Y+1:GOTO PPRINT(X,Y+51)
520 Y=Y+1:GOTO PPRINT(X,Y+52)
530 Y=Y+1:GOTO PPRINT(X,Y+53)
540 Y=Y+1:GOTO PPRINT(X,Y+54)
550 Y=Y+1:GOTO PPRINT(X,Y+55)
560 Y=Y+1:GOTO PPRINT(X,Y+56)
570 Y=Y+1:GOTO PPRINT(X,Y+57)
580 Y=Y+1:GOTO PPRINT(X,Y+58)
590 Y=Y+1:GOTO PPRINT(X,Y+59)
600 Y=Y+1:GOTO PPRINT(X,Y+60)
610 Y=Y+1:GOTO PPRINT(X,Y+61)
620 Y=Y+1:GOTO PPRINT(X,Y+62)
630 Y=Y+1:GOTO PPRINT(X,Y+63)
640 Y=Y+1:GOTO PPRINT(X,Y+64)
650 Y=Y+1:GOTO PPRINT(X,Y+65)
660 Y=Y+1:GOTO PPRINT(X,Y+66)
670 Y=Y+1:GOTO PPRINT(X,Y+67)
680 Y=Y+1:GOTO PPRINT(X,Y+68)
690 Y=Y+1:GOTO PPRINT(X,Y+69)
700 Y=Y+1:GOTO PPRINT(X,Y+70)
710 Y=Y+1:GOTO PPRINT(X,Y+71)
720 Y=Y+1:GOTO PPRINT(X,Y+72)
730 Y=Y+1:GOTO PPRINT(X,Y+73)
740 Y=Y+1:GOTO PPRINT(X,Y+74)
750 Y=Y+1:GOTO PPRINT(X,Y+75)
760 Y=Y+1:GOTO PPRINT(X,Y+76)
770 Y=Y+1:GOTO PPRINT(X,Y+77)
780 Y=Y+1:GOTO PPRINT(X,Y+78)
790 Y=Y+1:GOTO PPRINT(X,Y+79)
800 Y=Y+1:GOTO PPRINT(X,Y+80)
810 Y=Y+1:GOTO PPRINT(X,Y+81)
820 Y=Y+1:GOTO PPRINT(X,Y+82)
830 Y=Y+1:GOTO PPRINT(X,Y+83)
840 Y=Y+1:GOTO PPRINT(X,Y+84)
850 Y=Y+1:GOTO PPRINT(X,Y+85)
860 Y=Y+1:GOTO PPRINT(X,Y+86)
870 Y=Y+1:GOTO PPRINT(X,Y+87)
880 Y=Y+1:GOTO PPRINT(X,Y+88)
890 Y=Y+1:GOTO PPRINT(X,Y+89)
900 Y=Y+1:GOTO PPRINT(X,Y+90)
910 Y=Y+1:GOTO PPRINT(X,Y+91)
920 Y=Y+1:GOTO PPRINT(X,Y+92)
930 Y=Y+1:GOTO PPRINT(X,Y+93)
940 Y=Y+1:GOTO PPRINT(X,Y+94)
950 Y=Y+1:GOTO PPRINT(X,Y+95)
960 Y=Y+1:GOTO PPRINT(X,Y+96)
970 Y=Y+1:GOTO PPRINT(X,Y+97)
980 Y=Y+1:GOTO PPRINT(X,Y+98)
990 Y=Y+1:GOTO PPRINT(X,Y+99)
1000 Y=Y+1:GOTO PPRINT(X,Y+100)

```

## Moving across

Thus you move across the screen one X count at a time whilst Y rows deep, and when you have collected 255 bytes you need send a carriage return CHR(13), and then move down the Y axis of the screen seven rows and start to calculate the next line of graphics print. Note that in graphics mode no gaps are left between any of the lines so they will join up neatly.

In the four-colour modes (left and right) in pairs to indicate the four colours:

	First bit	Second bit
First colour	OFF	OFF
Second colour	OFF	ON
Third colour	ON	OFF
Fourth colour	ON	ON

and a consequence of this is that a four colour screen will print out as white, black, and left and right-handed zebra stripes. There are ways around even that problem which allow you to produce more subtle shading, as well as scaling and partial



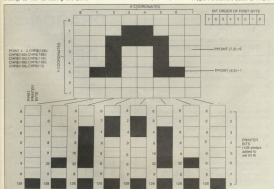
prints, as shown in some of the examples.

It is not necessary to have the screen-print routine included in a program producing graphics you may wish to print. You can store graphics (or even text) pages on tape by using CASRAM, and appropriate memory values according to the PPRINT, and then CLORINT them back for later printing.

Although the screen to print conversion through Basic is not exactly superficial it proceeds at a reasonable rate especially considering there are up to 40K calculations to be made. You can speed it up with

PPRINT=PPRINT/2 but be sure to remember that you must reset the speed before you can save or load.

A comprehensive menu-driven program for printing the Dragon hi-resolution screen with the Sekosha GP100A is available from the author. The program allows full or partial screen printing in black and white, inverse black and white, and four shades. It also includes a scaling-up facility, and details of how to produce custom shading patterns. It costs £9.95 on cassette or £2.95 as a listing. Roth Brain's address is Penlygen, Doreham, Cambs CP4 7UT.



Conversion of a high-resolution screen to a GP100A graphics format



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# Open File

## Hex

This program shows the graphics capability of the Dragon and the fairly colour-mad. Written in mode 3, a colourful and impressive display can be achieved with the minimum of programming. The game itself is a new version of an old Chinese boardgame.

The instructions are included in the print-out, but the object of this two-player game is to be the first to build a "bridge" of counters across the hexagonal board, whilst trying to block your opponent by

trapping him/her. The first to do so wins the game (after a game is won the program must "break" and run again). This program was submitted by D. Owen of Pottwich, Manchester.

### Program notes

Lines 60-120 Opening program by asking for instructions.  
140-350 Sets up mode, colour of screen and characters.  
370-430 Draws screen layout.  
440-1010 Test to determine set colour of point (X,Y).

1100 As there are 11 rows on the board, CHR\$(58), "" is used for 11.  
1170 As above, "E" is used for row 10.  
1200-1300 The INKEY\$ function finds letter on the keyboard being selected and converts it into a row number.  
1320 Computes area being tested in lines 1040 and 1090.  
Keys A-K Rows 1-11 (rows A-K on screen).  
A-K Columns 1-11 (columns 1-11 on screen).

```

10 REM *****
20 REM *   HEX   *
30 REM * BY D. R. OWEN *
40 REM *   JAN 83   *
50 REM *****
60 CLS:PLAY"TZSSADDDCEZAFDCDBFANDGCFEDABDFEBCFAGGCBADL12GADB"
70 SOUND60,3
80 PRINT@13,"HEX ";
90 PRINT@45,"====";
100 PRINT@90,"DO YOU WANT INSTRUCTIONS? (Y/N)"
110 D$ = INKEY$:IF D$ = "Y" THEN 140
120 IF D$ = "N" THEN 360
130 IF D$<>"Y" OR D$<>"N" THEN 100
140 "INSTRUCTIONS
150 SOUND140,5
160 CLS:G
170 PRINT@35,"THE RULES OF HEX"
180 PRINT@57,"=====
190 PRINT@120,"THE OBJECT OF THE GAME IS TO BRIDGE THE PLAYING BOARD WITH YOUR
COUNTERS, EG. BY TAKING TURNS, THE PERSON FIRST TO COMPLETE HIS BRIDGE ACROSS THE
BOARD WINS. WHITE GOES FIRST. WATCH OUT FOR SOME SLY TACTICS";
200 PRINT@440,"PRESS RETURN FOR MORE";
210 P$ = INKEY$:IF P$ = CHR$(13) THEN 230
220 IF P$<>CHR$(13) THEN 210
230 CLS:G
240 PRINT@2,"HOW TO PLACE YOUR PIECES";
250 PRINT@34,"=====
260 PRINT@97,"PIECES ARE PLACED ON THE BOARD BY INPUTTING THE CORRECT CO-ORDINATES
OF THE DESIRED POSITION, EG. G,7 WOULD PLACE EITHER A WHITE OR AN ORANGE COUNTER
ON POSITION G,7 AND SO ON";
270 PORN = 1706000:NEXTI
280 CLS:G
290 PRINT@35,"HINT";
300 PRINT@57,"=====
310 PRINT@125,"SINCE THE OBJECT OF THE GAME IS TO BUILD A BRIDGE ACROSS THE BOARD, AS
WELL AS TRYING TO BUILD ONE YOURSELF, YOUR OPPONENT IS ALSO TRYING TO BUILD ONE
SO A GOOD TACTIC WOULD BE TO BLOCK HIS/HER PATH";
320 PRINT@440,"PRESS RETURN TO START";
330 P$ = INKEY$
340 IF P$ = CHR$(13) THEN 360
350 IF P$<>CHR$(13) THEN 320
360 "START
370 PMODES,1
380 COLOURS,7
390 PCLS
400 SCREEN1,1
410 FOR N = 11 TO 1 STEP - 1
420 X = 15 - 10*N/2 : Y = 12 + 5*N/21 : 172 - 5*N
430 I = 9 TO N

```

Continued on page 40

# Open File

```

445 X1 = X + 28+1 + 10*32 = X1 + 10*32 = X2 + 10
450 LINE(X1,Y0 - 8) - (X1,Y0 - 3),PSET
460 LINE(X1,Y1 + 8) - (X1,Y1 + 10),PSET
470 IF I = N THEN 530
480 LINE(X1,Y0 - 8) - (X2,Y0 - 11),PSET
490 LINE(X2,Y0 - 11) - (X3,Y0 - 8),PSET
500 LINE(X1,Y1 + 13) - (X2,Y1 + 16),PSET
510 LINE(X2,Y1 + 16) - (X3,Y1 + 13),PSET
520 NEXT I
530 NEXT N
540 PRINT:GOTO 5.5
550 FOR I = 66TO66:PSET(14,1,5):NEXT:PSET(12,85,5):PSET(12,90,5):PSET(16,90,5)
560 PSET(28,78,5):PSET(22,77,5):PSET(24,78,5):PSET(24,79,5):PSET(22,89,5):PSET(29,81,5):
PSET(28,82,5):PSET(22,82,5):PSET(24,82,5)
570 PSET(38,70,5):PSET(32,69,5):PSET(34,70,5):PSET(34,71,5):PSET(32,72,5):PSET(34,73,5):
PSET(34,74,5):PSET(32,75,5):PSET(38,74,5):PSET(34,89,5)
580 FOR I = 61TO66:PSET(84,5,5):NEXT:PSET(49,81,5):PSET(49,82,5):PSET(49,83,5):PSET(49,84,5):
PSET(42,84,5)
590 PSET(58,54,5):PSET(52,54,5):PSET(54,54,5):PSET(58,55,5):PSET(58,56,5):PSET(52,56,5):
PSET(54,57,5):PSET(54,58,5):PSET(52,59,5):PSET(58,59,5)
600 FOR I = 46TO58:PSET(88,1,5):NEXT:PSET(82,45,5):PSET(82,51,5):PSET(84,59,5):PSET(84,49,5):
PSET(83,48,5)
610 PSET(70,38,5):PSET(72,38,5):PSET(74,38,5):PSET(74,39,5):PSET(72,40,5):PSET(70,41,5):PSET(70,42,5):
PSET(78,43,5)
620 PSET(82,38,5):PSET(80,31,5):PSET(88,32,5):PSET(84,31,5):PSET(84,32,5):PSET(80,33,5):PSET
(88,34,5):PSET(88,35,5):PSET(84,34,5):PSET(84,35,5):PSET(82,36,5)
630 FOR I = 32TO35:PSET(84,1,5):NEXT:PSET(90,21,5):PSET(90,22,5):PSET(90,23,5):PSET(92,24,5):PSET
(92,27,5)
640 FOR I = 15TO18:PSET(108,1,5):PSET(104,1,5):NEXT:PSET(102,14,5):PSET(102,19,5)
650 PSET(112,7,5):PSET(112,8,5):PSET(112,10,5):PSET(112,11,5)
660 FOR I = 100TO105:PSET(10,1,5):PSET(14,1,5):NEXT:PSET(12,96,5):PSET(12,102,5)
670 FOR I = 106TO111:PSET(20,1,5):NEXT:PSET(22,106,5):PSET(24,107,5):PSET(22,108,5):PSET
(24,109,5):PSET(24,110,5):PSET(22,111,5)
680 FOR I = 118TO118:PSET(30,1,5):NEXT:PSET(32,114,5):PSET(32,119,5):PSET(34,115,5):PSET(34,116,5)
690 FOR I = 123TO128:PSET(40,1,5):NEXT:FOR I = 124TO127:PSET(44,1,5):NEXT:PSET(42,123,5):
PSET(42,126,5)
700 FOR I = 131TO138:PSET(50,1,5):NEXT:PSET(52,131,5):PSET(54,131,5):PSET(52,133,5):
PSET(52,136,5):PSET(54,136,5)
710 FOR I = 139TO144:PSET(80,1,5):NEXT:PSET(82,139,5):PSET(84,139,5):PSET(82,142,5)
720 FOR I = 145TO151:PSET(70,1,5):NEXT:PSET(72,147,5):PSET(74,148,5):PSET(72,152,5):
PSET(74,151,5):PSET(74,150,5):PSET(74,153,5):PSET(72,159,5)
730 FOR I = 152TO160:PSET(80,1,5):PSET(84,1,5):NEXT:PSET(82,157,5)
740 FOR I = 161TO166:PSET(82,1,5):NEXT
750 FOR I = 171TO175:PSET(104,1,5):NEXT:PSET(102,171,5):PSET(102,175,5):PSET(100,175,5)
760 FOR I = 179TO184:PSET(110,1,5):NEXT:PSET(114,179,5):PSET(114,180,5):PSET(112,181,5):
PSET(112,182,5):PSET(114,183,5):PSET(114,184,5):PSET(114,184,5):PSET(114,184,5):PSET(114,184,5)
780 LINE(5,188)-(5,188),PSET
790 LINE(5,188)-(182,188),PSET
800 LINE(5,188)-(182,188),PSET
810 PRINT:GOTO 5.5
820 COLORS,6
830 LINE(158,188)-(250,188),PSET
840 LINE(158,188)-(250,188),PSET
850 LINE(258,188)-(258,188),PSET
860 PRINT:GOTO 5.5
870 LINE(5,84)-(5,5),PSET
880 LINE(5,5)-(102,5),PSET
890 LINE(102,5)-(5,84),PSET
900 PRINT:GOTO 5.5
910 COLORS,6
920 LINE(158,5)-(258,5),PSET
930 LINE(258,5)-(258,84),PSET
940 LINE(258,84)-(158,5),PSET
950 PRINT:GOTO 5.5
960 FOR I = 185TO194:PSET(184,1,8):PSET(184,1,8):PSET(218,1,8):NEXT

```

```

990 FORI=0TO:
995 PSET(195,169 + I):PSET(199,169 + I):PSET(203,169 + I):PSET(207,169 + I):NEXT
999 FORI = 0TO:PSET(212,165 + I):PSET(214,165 + I):PSET(216,165 + I):PSET(218,169 +
I):PSET(214,169 + I):PSET(212,173 + I):PSET(214,173 + I):PSET(216,173 + I):PSET(218,173 +
I):NEXT
1005 PSET(224,165.5) : PSET(224,166.5) : PSET(226,167.5) : PSET(226,168.5) : PSET(228,16.9.5) : PSET
(228,170.5) : PSET(230,167.5) : PSET(230,168.5) : PSET(232,16.9.5) : PSET(232,170.5) :
PSET(234,168.5) : PSET(234,167.5) : PSET(236,166.5) : PSET(236,165.5) : PSET(238,171.5) :
PSET(238,173.5) : PSET(234,173.5) : PSET(234,174.5) : PSET(236,17,1.5
1010 PSET(230,172.5):PSET(232,173.5):PSET(232,174.5)
1020 GOSUB1140
1030 GOSUB1130
1040 IF PPOINT(X,Y) = T THEN 1050
1050 SOUND19.5:GOTO1020
1060 PRINT(X,Y) 5.5
1070 GOSUB1140
1080 GOSUB1130
1090 IF PPOINT(X,Y) = ? THEN 1110
1100 SOUND19.5:GOTO1070
1110 PRINT(X,Y)5.5
1120 GOTO1020
1130 GOTO1130
1140 AS = INKEY$:IF AS = "" THEN 1140
1150 BS = INKEY$:IF BS = "" THEN 1150
1160 IF BS = CHR$(58) THEN B = 11:GOTO1260
1170 IF BS > "<" THEN 1190
1180 B = 12:GOTO1200
1190 B = VAL(BS)
1200 IF AS = "A" THEN A = 1
1210 IF AS = "B" THEN A = 2
1220 IF AS = "C" THEN A = 3
1230 IF AS = "D" THEN A = 4
1240 IF AS = "E" THEN A = 5
1250 IF AS = "F" THEN A = 6
1260 IF AS = "G" THEN A = 7
1270 IF AS = "H" THEN A = 8
1280 IF AS = "I" THEN A = 9
1290 IF AS = "J" THEN A = 10
1300 IF AS = "K" THEN A = 11
1310 RETURN
1320 X = ? + 10*(A + B):Y = 94 + 9*(A - B)
1330 RETURN

```

Writing a program to read, edit and record a data file is straightforward, but if the same could be done for a program file then Dragon users would be able to move lines around, merge and append programs for instance, in short a text editor.

This program shows how to read in program into an array, which can then be manipulated as required.

First you must record the program to be read in ASCII format using Cause's name "A. Don't worry about the unusual noises emerging from the Dragon during this operation. Then the following program will read it into array FS, a line to each element.

To edit the program, just deal with each array element as if it were a string. To save the edited program, just write it to the cassette as if it were a data file, ie Print -1:FS(1):FS2).

Don't forget to make enough string space available with a Clear. This program was submitted by M. Tagger of Fleet, Hants.

## Basis of a text editor

```

10 CLEAR 10000
20 DIM F$(200)
30 OPEN "I", -1, " name "
40 I=0
50 IF EOF(-1) THEN 100
60 INPUT -1,E$
70 F$(I)=E$
80 I=I+1
90 GOTO 50
100 CLOSE -1

```



### Cruising on Broadway

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## Pacman

This is a Pacman-type game which has been translated from *Smash Basic* to *Dragon Basic*. The program takes up about 3K of Ram.

The object of the game is to eat as many of the power pills 'A' and as many pills '1' as possible before the ghost eats you. You or the ghost cannot go through walls. You can choose between two speeds fast or slow. This is asked for at the start of the

game. If you get 5,000 or 10,000 points you get an extra life.

This program uses sound to tell you if you have any power or if you eat a power pill or if you eat a pill.

The program also has high scores and if you have the highest score it asks for your name. Then at the end of every game and if no one beats your score your name is printed.

The program uses a Peak to find out if you have hit anything and the same with the ghost.

The program should be bug-free and I

hope that all Dragon owners have a good time. A tip for Dragon users:

If you are saving a program and you wish to find-out if it is saved correctly then if you re-read your tape and then type in *Load 'verify'* then this checks if the program is saved correctly.

If you get a 'NO' error then it is not saved correctly. If it is OK, then press 'reset' to get back to your program. This does not go over the program in memory — that is if you don't have a program called 'verify' on the tape. This program was submitted by B. Watson of Edinburgh.

```

10 REM %C1 1/2/83 BRIAN WATSON
20 CLR
30 INPUT "FAST OR SLOW ?(A)"
40 IF A$ = "F" OR A$ = "FAST" THEN
    PEEK 45495,0
50 IF A$ = "S" OR A$ = "SLOW" THEN
    PEEK 45494,0
60 B$ = "B": REM [INVERSE "B"
70 SS = 0:CD = 0
80 LL = 4
90 CL:RA
100 L = L + 1
110 WA = ""
120 RESTORE
130 FOR N = 0 TO 405 STEP 32: READ
    A$: PRINT A$(A+1): NEXT
140 M = 445: B = 335
170 PRINT @15,"POWER=":INT IPD:
    - @1: PRINT @81,"LIVES=":LL: PRINT
    - @21 + 32,"SCORE=":SS:
180 PRINT @H,"25:1PM = M
190 IF PD < 4 THEN B$ = "O": REM
    [INVERSE "B"
200 IF PD < > 0 THEN PD = PD -
    .5
210 IF PD > 4 THEN B$ = "O": REM
    [NORMAL "B"
220 IF PD < > 0 THEN PLAY"04L20
    00"
230 IF PD = 1 THEN PLAY"01L20040
    2L200403L200404L2004"
240 PRINT @5, @15: @14
250 IF SS = 3000 THEN LL = LL +
    1: SS = SS + 1
260 IF SS = 10000 THEN LL = LL +
    1: SS = SS + 1
270 B$ = [INVERSE
280 IF B$ = "I" THEN M = M - 32
290 IF B$ = "W" THEN M = M + 32
300 IF B$ = "3" THEN M = M - 3
310 IF B$ = "O" THEN M = M + 1
320 IF PEEK (3024 + M) = 9 THEN
    M = MH
330 IF PEEK (3024 + H) = 104 THEN
    PLAY"04L304" : PD = 50: SS = SS
    + 50
340 IF PEEK (3024 + H) = 110 THEN
    PLAY"02L2004L2004L2004L2004" : CD =
    CD + 1: SS = SS + 1
340 IF CD = 175 OR CD = 174 THEN
    CD = 0: GOTO 100
350 GOSUB 400
360 GOTO 170
370 M = MH: GOTO 260
400 REM MOVE GHOST
410 R$ = RND 155
420 RY = RND 131
430 IF R$ = 1 THEN G = G + 1
440 IF RY = 1 THEN G = G - 32
450 IF R$ = 3 THEN G = G - 1
460 IF RY = 3 THEN G = G + 32
470 PRINT @H," "
480 PRINT @60, R$:
490 W$ = "
500 IF B = M OR G$ = M OR G$ = M
    M OR B = M THEN GAO
520 IF PEEK (3024 + G) = 7 THEN
    G = G$
530 IF PEEK (3024 + G) = 110 THEN
    W$ = "
540 IF PEEK (3024 + G) = 104 THEN
    W$ = "A"
550 KILLIM
560 IF PD < > 0 THEN @90
570 PLAY"1004L1004L500"
580 LL = LL - 1: IF LL = - 1 THEN
    @90
590 PRINT @H," " : @1: GOTO 140
600 PRINT "END LUCK YOU'RE TOO
    SLOW","HA! HA! HA!"
610 FOR Y = 1 TO 10
620 PLAY"120040406-POL2004L2004L2
    00020020"
630 NEXT
640 CLR
650 IF SS < H$ THEN @70
660 IF SS > H$ THEN H$ = SS: INPUT
    "WHAT IS YOUR NAME ?(A)"
670 PRINT " THE HIGHEST SCORE HAS
    5: "H$ BY "H$
680 FOR I = 1 TO 5000: NEXT I: GOTO
    10
690 REM EATEN GHOST
700 PD = 0
710 SS = SS + RND (4) + 50
720 B = 335
730 PLAY"1504L1004L1504L2004"
740 GOTO 170
750 REM NAME...ALL LETTER "I" A

```

Continued on page 45





## Open File

RE IN INCREASE IN THE RATE		ISS	DATA	T	
760	DATA	"0000000000000000"	840	DATA	"1.0000000000000000"
770	DATA	"0000000000000000"	850	DATA	"1.0000000000000000"
780	DATA	"0000000000000000"	860	DATA	"1.0000000000000000"
790	DATA	"0000000000000000"	870	DATA	"1.0000000000000000"
800	DATA	"0000000000000000"	880	DATA	"1.0000000000000000"
810	DATA	"0000000000000000"	890	DATA	"1.0000000000000000"
820	DATA	"0000000000000000"	900	DATA	"1.0000000000000000"
			910	DATA	"1.0000000000000000"

## Character generator

This program allows you to design  $5 \times 5$  characters for the high resolution screen. When the program is run a large  $5 \times 5$  grid appears on the screen.

In the top left hand corner is a flashing cursor, this cursor can be moved around the screen by the use of the four arrow

keys. If you wish to fill any of the squares with a value, then shift key is used.

When you have finished your design, move the cursor out of the grid or into blank square then press key 5. The five arrays you can use (A to E) are plotted on the right side of the grid, if the array is empty a black square is shown. Any characters speed can be stored on tape and then you can go back to them later by [www.bbc.com](http://www.bbc.com)

You can use offer codes and adjust by altering the BIDD but I have found that maybe it is the most clear to use. This document was submitted to us by C

Heinrich Heine, *Wanderer des Nordens*, München, 1970.

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**10000-10000** Sets up arrays and closes. Right-clicks on the array.

**81 00-0020** Controls the cursor movement and reads the keyboard

8000-8080 Photo character at bottom of  
recessed

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**0450-0910** Claf's character from bottom of screen and stores this in the array selected then returns to book new amount.

[illegible][illegible][illegible]

## Drawing

The line function on the Dragon is a very useful feature; however, it is limited to drawing a line from A to B, or else use the (Close command).

Here is a program that you can feed into the Dragon, then kick it around and have hours of fun. For example, clock fingers moving at any speed, printing points of a circle or oval. It can be used in all kinds of programs. This program was submitted by W. Slater of Birmingham, Cheshire, Derbyshire.

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The figure 50 in line 50 is half the number of lines or points to be drawn in the circle or oval.

The figure 50 in lines 63 and 70 gives the size of the circle or dimensions of an oval.

```

10 P MODE 4,t: SCREEN1,t: PCLS.
20 DEF FN R (X) = 4.0 + ATN(1.0)
30 FOR T = 0 TO 10000
40 TIMER = 0
50 A = T/30 + FN R (A)
60 X = 128 + 80 * COS (A)
70 Y = 96 + 80 * SIN (A)
80 LINE (128,96) - (X,Y),PSET
90 IF TIMER = 48 THEN GOSUB 1000
10 NEXT T
999 END
1000 LINE (128,96) - (X,Y),PRESET
99 RETURN

```

# Open File

## Dragonet

This program was devised while playing

around with the Draw command. Careful attention must be given to the instruction in the Draw command to prevent Paint spill. It is left up to you to discover exactly what it does. This program was submitted by J.

Till who comes from Rochester, Kent.

### Program notes

10-120

100-100

Draw the figure.

Movement.

```
5      REM DRAGONET BY J. TILL
10     PMODE 3,1 : SCREEN 1,0 : POLS3
20     DRAW "BM150,170 : 516C4D2L1W2E1W3E1W3H1
        U1H1L1H1L1H1L1W1H1W1H2U1H1W2H1W2
        E2U1E2H1E1H1U1F1R1E1R2D1R2F1R4G1O2
        F5O3O1O3O2O1L1G4L2G4D1G1D1G1D2G1D5"
30     DRAW "BM-15,-30 : E3R2F2D1G2L1G1L1H1L1H1U1E1"
40     DRAW "BM-18,-1 : WCE2H2F1R1D1F1G2L3H3"
50     DRAW "BM-1,-10 : U1H2O1H1L1G1L1G1L1G1R1F1
        R1E1R2F1E1R2"
60     DRAW "BM-1,-10 : H1O1D1F1E1U1 : BM-4,0 : H1G1
        D1F1E1U1"
65     PAINT (120,160),4,4
70     DRAW "BM-7,-2 : G2O2F1R1"
80     DRAW "BM-18,-1 : L1H2U2E2"
90     PAINT (80,65),2,4
100    PAINT (150,55),2,4
110    DRAW "BM 60,100 : C4E5F1G5L2E3"
120    PAINT (62,179),4,4
130    CIRCLE (83,160),5,2
140    PAINT (83,160),2,2
150    FOR I = 1 TO 500 : NEXT I
160    CIRCLE (83,160),5,4
160    PAINT (83,160),4,4
170    FOR I = 1 TO 500 : NEXT I
180    GO TO 130
```

## Noughts and crosses

This program prints the noughts-and-crosses grid on the screen, and then

invites you to play the game; first by typing a bit (depending on which you are, and then by typing a number between 1 and 9; 3 is top right, 9 is bottom right, etc. This program is by G. Davies of Eastleigh.

**Program notes**  
Lines

2-10 Print headings and clear screen.

20-60

Set hi-res graphics and draws grid.

70-100

Established whether it is "x" or "o".

500-600

Established position of "x's" on grid.

700-800

Established position of "o's" on grid.

2000-2400

Draw the "x's" on the screen.

3000-3400

Draw the "o's" on the screen.

```

1 REM "noughts and crosses"
2 REM "CARL DAVIES, 1982"
3 PRINT @ 128 + 11, "NOUGHTS"
4 PRINT @ 192 + 13, "AND"
6 PRINT @ 256 + 11, "CROSSES"
8 FOR Z = 1 TO 1300:NEXT Z
10 CLS
20 PMODE 3,1:SCREEN 1,0:PCLS
30 LINE (110,20) - (110,140),PSET
40 LINE (150,20) - (150,140),PSET
50 LINE (70,60) - (190,60),PSET
60 LINE (70,100) - (190,100),PSET
70 AS = INKEY$
80 IF AS = "x" THEN GOSUB 500:
90 IF AS = "o" THEN GOSUB 700:
100 GOTO 70
500 BS = INKEY$
510 IF BS = "1" THEN GOSUB 2000:
520 IF BS = "2" THEN GOSUB 2050:
530 IF BS = "3" THEN GOSUB 2100:
540 IF BS = "4" THEN GOSUB 2150:
550 IF BS = "5" THEN GOSUB 2200:
560 IF BS = "6" THEN GOSUB 2250:
570 IF BS = "7" THEN GOSUB 2300:
580 IF BS = "8" THEN GOSUB 2350:
590 IF BS = "9" THEN GOSUB 2400:
600 GOTO 500
700 CS = INKEY$
710 IF CS = "1" THEN GOSUB 3000:
720 IF CS = "2" THEN GOSUB 3050:
730 IF CS = "3" THEN GOSUB 3100:
740 IF BS = "4" THEN GOSUB 3150:
750 IF BS = "5" THEN GOSUB 3200:
760 IF BS = "6" THEN GOSUB 3250:
770 IF BS = "7" THEN GOSUB 3300:
780 IF BS = "8" THEN GOSUB 3350:
790 IF BS = "9" THEN GOSUB 3400:
800 GOTO 700
2000 LINE (80,30) - (100,50),PSET
2010 LINE (100,30) - (80,50),PSET
2020 GOTO 70
2050 LINE (120,30) - (140,50),PSET
2060 GOTO 70
2100 LINE (160,30) - (180,50),PSET
2110 LINE (180,30) - (160,50),PSET
2120 GOTO 70
2150 LINE (80,70) - (100,90),PSET
2160 LINE (100,70) - (80,90),PSET
2170 GOTO 70
2200 LINE (120,70) - (140,90),PSET
2210 LINE (140,70) - (120,90),PSET
2220 GOTO 70
2250 LINE (160,70) - (180,90),PSET
2260 LINE (180,70) - (160,90),PSET
2270 GOTO 70
2300 LINE (80,110) - (100,130),PSET
2310 LINE (100,110) - (80,130),PSET
2320 GOTO 70
2350 LINE (120,110) - (140,130),PSET
2360 LINE (140,110) - (120,130),PSET
2370 GOTO 70
2400 LINE (160,110) - (180,130),PSET
2410 LINE (180,110) - (160,130),PSET
2420 GOTO 70
3000 LINE (80,30) - (100,50),PSET,B
3010 GOTO 70
3050 LINE (120,30) - (140,50),PSET,B
3060 GOTO 70
3100 LINE (160,130) - (180,50),PSET,B
3110 GOTO 70
3150 LINE (80,70) - (100,90),PSET,B
3160 GOTO 70
3200 LINE (120,70) - (140,90),PSET,B
3210 GOTO 70
3250 LINE (160,70) - (180,90),PSET,B
3260 GOTO 70
3300 LINE (80,110) - (100,130),PSET,B
3310 GOTO 70
3350 LINE (120,110) - (140,130),PSET,B
3360 GOTO 70
3400 LINE (160,110) - (180,130),
PSET,B
3410 GOTO 70

```

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**Game Pack 3**

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## No Joy on Joysticks

I HAVE a Dragon 32 and on page 88, 89 and 90 of the manual there is a game using joysticks. It is supposed to be a battle between two ships in space. It uses the joystick to move your craft and the fire button to operate your weapon to hit the other ship. But when I press the fire button on the left joystick the right joystick's ship fires at me and vice-versa. I think that the trouble is, in lines 148, 160 and 161, it is possible that you find out if there is an error signal.

John White (Age 12),  
Aylesbury,  
Bucks

IT APPEARS THAT you have an earlier edition of the manual with a misprint on the joystick commands. The joystick is actually reversed from these given, is JOYSTICK (6) and (7) refer to right joystick and JOYSTICK (7) and (6) is the left joystick. The simplest method of altering the program on page 88 is to reverse the scores and the buttons. Answer from 128, 158 and 168 as below:

```
128 CLS:FOR 7=0 TO 5:PRINT @0.2(1-C:PRINT @.2(1-C)
```

```
158 IF P = 1:GOTO P = 250  
THEN P = 1:GOTO 250
```

```
168 IF P = 1:GOTO P = 250  
THEN P = 0:GOTO 250
```

## SAM explained

I WROTE if you could answer the following queries I have on computers and programming.  
1) What is SAM?

2) Is there any way which I could write a program that can totally ignore commands like list and save?

3) Is it possible to damage the computer by "Poking" a wrong number?

P.Ransom,  
Great Mizon  
Stockport

THE SAM IS a Spokenword Address Multiliner which controls the way in which the memory works. It is programmed to work in conjunction with the Video Display Generator to con-



trol PRODS and also works in conjunction with the processor to update the RAM.

There is no simple way to write a program which ignores commands such as LIST and BREAK. You would need a good knowledge of machine code and the Basic Interpreter in order to do this.

Temporary existing can be brought about by FOR/NEXT in the wrong number, especially in the area of the SAM chip but no permanent damage should be done.

## Call for software

MY 32M has had a Dragon 32 for several months now but is still very disappointed at the quality of software printed in computer magazines. I tried managed to get hold of a magazine called Rainbow. I would like to know if you could supply me with the name and address of the distributors in this country.

M.A.Cannolly,  
Bewdley,  
Worce.

THE MAGAZINE RAINBOW is available in this country, from (Elex Electronics, 28 Ivy Road, Farnworth, Manchester, Tel: 061-773 3863.

## Programs disappear

COULD YOU please explain to me why errors start to appear, and whole lines — even programs — start to disappear on my Dragon, after a while in the higher resolutions, especially re-running a par-

ticular program? I have noticed that many of such disappearing programs do not contain FOR/NEXT or CLAMP statements, but I'm not sure whether this is important, is my Dragon faulty or am I one of many with the same problem?

Dennis Lawrence,  
South Wood,  
London.

WE ARE AT PRESENT looking into the type of problem you have encountered. Transients in the domestic power supply may cause loss of programs and corruption, as described. If this is the case then pressing RESET or switching the machine off then on again usually clears the problem. However, it may be worth while returning your machine to the original dealer for testing as you may have a fault on the Dragon itself.

## Skipping data

MY DRAGON 32 will not accept a very long, supposedly Microsoft compatible program, Sea Battle, taken from Creative Computing's More Basic Computer Games. Data statements appear in a number of places and these are implemented by the use of "FOR/NEXT" followed by the line number of the data statement as required. The Dragon gives the 4 syntax error at each NEXTEND.

Preliminary instructions acknowledge possible difficulty and advise: "Improve by Using a For/NEXT and FOR...NEXT with Basic statements to skip over the data that should be ignored". I do not understand this advice — can you assist the please?

W.A.Coyne,  
Southwick,  
Brighton.

RESTORE IS USED to get to the beginning of the data and, once used, the only way to get to any particular bit of data is by reading through all data before it. For example, to get to the fifth bit of data use RESTORE followed by FOR I = 1 TO 5 READ AS NEXT. This will read the first five values into AS successively, and leave the fifth one there.

## Crashing at speed

ON MORE than one occasion your magazine has pointed information that the speed at the Dragon 32 can be increased by FOR/NEXT statements. On my machine this always results in immediate program crash. It is necessary to switch off to regain control. What am I doing wrong?

J.Hayden,  
Widewater,  
South Africa.

THE DRAGON 32 HAS been designed to work at a certain speed and the FOR/NEXT mentioned causes it to run at double speed. Therefore it is working out of the original design specifications and may crash. We do not recommend the use of this FOR/NEXT for the above reasons.

## Solution is a loop

I HAVE got a Dragon 32 and for the past few weeks have been trying to write a certain program. It involves the user putting in a number, say five. The computer then adds five + four + three + two + one. If the number was 10, the computer would add 10 + 9 + 8 etc. I haven't had any success in writing the program and hope you can help me out.

Glen Dennis,  
Morden,  
Surrey.

THE TYPE OF PROGRAM you require is made relatively simple using the FOR/NEXT loop.

```
10 ANSWER = 0:FOR I = 1 TO
```

```
5:
```

```
20 CLS
```

```
30 INPUT "NUMBER" N
```

```
40 IF N=0 THEN GO ELSE 10
```

```
50 FOR A = 1 TO N
```

```
60 ANSWER = ANSWER + A
```

```
70 NEXT A
```

```
80 PRINT ANSWER
```

```
90 IF ANSWER = 0 THEN GO
```

```
ELSE 10
```

# Win a printer

ONE OF THE advantages of a computer is its unflinching ability to carry out its tasks. Even when it is running a complex program, say, high level chess, the computer is always ready and willing for another game. Similarly, its capability of repeatedly carrying out simple calculations hundreds or thousands of times, is far superior to when the task is performed by a human operator. Where fatigue and distraction could lead to errors. No matter how late the hour, the computer is, or should be, as bright as a button—or at least as bright as the VDU!

As an example of using the computer to run a program involving hundreds of individual calculations, let's consider some mathematical series. A series is a set of numbers, each of which bears a relationship to the preceding terms. Take this simple progression:

$$1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6 + \dots$$

This can be easily translated into a simple program, and if the program is run and the cumulative total displayed as each successive term is added, it can be seen to be converging towards a specific value. As

the series progresses, the total stabilises towards 0.693147... the natural logarithm of 2. This is one of the ways in which this value can be evaluated originally.

Other mathematical constants can be similarly found. The series  $1 + 1/1! + 1/2! + 1/3! + 1/4! + \dots$  converges on 2.718281828... the mathematical constant  $e$ . The evaluation might be factorial signs. For example,  $4!$  or factorial 4, equals  $4 \times 3 \times 2 \times 1$ .

That enigmatic constant,  $\pi$ , despite its irrational value, can be evaluated by means of a series. Here are just two series which produce  $\pi$ .

$$\text{SERIES (1): } 2 \times (2/1^2 - 2/3^2 + 4/5^2 - 4/7^2 + 6/9^2 - 6/11^2 + 8/13^2 - 8/15^2 + \dots)$$

Note that the numerator and denominator increase by two, but on alternate steps.

$$\text{SERIES (2): } 4 \times (1/1^4 - 1/3^4 + 1/5^4 - 1/7^4 + 1/9^4 - \dots)$$

It seems incredible that so simple a series as this can produce so complex a value as  $\pi$ .

The series that we have considered so far are all convergent — that is, they con-

verge to a definite value. Another type of series is called divergent — and these increase without limit. For instance the series

$$1 + 2 + 3 + 4 + 5 + 6 + 7 + \dots$$

will go this, increasing to infinity — or, in the case of a computer, until the mathematical capacity of the machine is exceeded. Obviously, if each successive term gets larger than the series is divergent. Does this mean that if successive terms get smaller, the series will converge to a finite value? Not necessarily — consider the following

$$1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6 + 1/7 + 1/8 + \dots$$

Here, although each term gets smaller the series does, in fact, diverge. This can be seen readily if we break the series up into sections. The two terms  $1/3 + 1/4$  sum to more than  $1/2 + 1/4$ . Therefore, these two terms are greater than  $1/2$ .

Similarly the next four terms,  $1/5 + 1/6 + 1/7 + 1/8$  are greater than  $1/3 + 1/5 + 1/6 + 1/8$ . This group is therefore also greater than  $1/2$ , as is the next group of eight terms, the next group of sixteen terms, and so on. We can now see that our final total must be greater than:

$$1 + 1/2 + 1/2 + 1/2 + 1/2 + 1/2 + \dots$$

Thus, it will diverge to infinity, although it will do so very slowly.

The rate of divergence of the series  $1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6 + 1/7 + 1/8 + \dots$  forms the basis of this month's competition.

It can be seen that the total sum exceeds 2 when the fourth term is added ( $1 + 1/2 + 1/3 + 1/4$ ). In order to exceed 3 the series has to be extended to include the eleventh term.

How many terms need to be added for the total to exceed each integer up to 10?

## Prizes

THE PRIZE FOR this month's competition is donated by the software house Microdust. The package offered is: one Epson MASTER 81 dot matrix printer for your Dragon, a word processing package and the full range of software from Microdust.

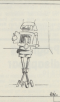
## Rules

TO WIN THE software and printer, all you have to do is send in the most elegant solution to the puzzle. You must show how the puzzle can be solved with

the use of a Basic program, developed on your Dragon 32 computer.

As a teaser, complete the sentence below in 10 words or less: I will use my Dragon 32 as a word processor because...

Your entry must arrive at Dragon User by the last working day in May 1983. The name of the winner, and the solution to the puzzle submitted by the winner, will be printed in the July issue of Dragon User. You may only enter the competition once. Entries will not be acknowledged and we cannot enter into correspondence on the result.





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