

DRAGON USER

International edition

The independent Dragon magazine

75p US\$3.25 June 1984

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machine code**

**Talking
in tongues**

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How to submit articles

The quality of the material we can publish in
Dragon Data 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 goodies 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 — but means writing it down
and passing it on to others.

Articles which are submitted to Dragon
Data for publication should not be more than
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panied by a tape of the program.

We cannot guarantee to return every
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solves riddles, solves jokes and many
other readers' problems

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Alpha Data is offering a disk drive as our
major prize in this month's competition and
as an added bonus, Melbourne House has
20 copies of Hungry Horrors to give away
in a Horrid Hunt maze puzzle

Editorial

WHAT HAVE JIFFY Signs, Space Communications and Dragon Data got in common?
Well, are drivers is that they were all displaying their respective wares at a recent
conference for electrical dealers.

Also at the conference was Dragon Data's managing director Brian Moore, giving us
glimpses into the future of information technology — and of Dragon Data itself. Brian's
vision of the future is exciting. The various technologies in the home, including
microcomputers, are expected to be combined as "multifunction products". So, for
example, "computers will increasingly have to contain communications hardware as a
basic requirement" and "will increasingly be involved in controlling home services, eg
security lighting and heating". And Dragon Data is developing its new products with this
trend in mind.

But the path to the future is not lined solely with roses — there will be some casualties
along the way. "Undoubtedly, there will be a shake out of manufacturers over the next
few years," Brian says, doubtless excluding Dragon Data itself from this particular trend.
In his speech to the electrical dealers Brian concentrated on the threat of the Japanese
micros running under the same operating system, MSX, written by Microsoft whose
Basic is used on the Dragon. As the micros share the same operating system, software
for one MSX machine should run on any other — although the first MSX does not reach
the UK, reportedly needs modifications to reach compatibility. This strategy "could
theoretically dominate major sectors of the home computer market". But, as Brian also
said, "it remains to be seen how the UK market will react to the strong marketing
presence of the major Japanese products". It also remains to be seen how the activities
of UK firms will affect Dragon Data. Sector made a success of following an independent
path with the Spectrum, and looks set to do so again with the CB, and high prices are
being made by companies new to the micro market. For example, the Amstrad micro,
including a monitor and built-in cassette recorder, is expected to be sold by Boots, whose
stores have sold so many Dragons.

Identifying why people buy a particular micro is as difficult as predicting who will avoid
the "shake out". Fortunately, Brian attributes some influence on purchasing to the power
of the press — although he puts it in less flattering terms: "Buying decisions are
influenced by fashion and a fair degree of media hype. A large and glowing specialist
press produces a barrage of advice and product evaluation." "An well, we'll try to maintain
the barrage, although it's a little ridiculous to hear that 'it is very fashionable to be writing
about home computers'. Excuse us while we go away to check our pants and fetch our
leather trousers from the cleaners.

Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters.

Page, Dragon User, 12-13 Little Newport Street, London WC2R 2LD.

Unsolved adventure

In YOUR March issue John Soren reviewed an arcade plus adventure game — Death Wiles of Sirius by Phoenix Software.

Having failed to complete the arcade game to find the leading code for the adventure, John left the game unsolved. If he had succeeded he would have found that the second part of the adventure is not "fixed only" but it is fixed in interesting graphic mode.

David Spencer

Edwin

Edwin

To the rescue

ONE OF our Dragon 32 titles, Death's Head Role, simulates the work of a cave rescue team.

A customer of ours, Mr D S. Benneman of 12 Park Street, Denbigh, Gwynedd, is a teacher training student, studying the feasibility of computer-aided learning in the school's outdoor education curriculum. He would be grateful to hear from anyone who has used Death's Head Role in a school, or as part of a club training scheme.

Harry Whitehouse

Phakoth

Barton-on-Sea

POKEing around

THE FOLLOWING POKES can quite effectively be used to get into your own output:

POKE 264, 167; POKE 265, 158; POKE 266, 1; POKE 267, 158

POKE 263, (ASCII code of character)

POKE 263, 134 (to activate); POKE 263, 57 (to de-activate).

We all know by now the famous POKES for disabling the BREAK key for program protection, but the RESET button may be pressed to exit your program and making the machine crash when RESET is pressed is not really satisfactory. So the following program causes the program currently in RAM to be run.

10 FOR A=54000 TO 54219

20 READ A3

30 POKE A, VAL("M" + A3)

40 NEXT

50 DATA 13, 46, 56, 57, 71, 81, 92, 98, 99, 12, 38, 82, 86, 32, 43, 44, 71, 83, 75, 70, 52, 55, 41, 26, 00

Then type EXEC 54000 and every time the RESET button is pressed the program will run.

Jonathan Hale

Swanton

More hints from hi-fi

WITH REGARD to the Hints from hi-fi letter in your March issue, demagnetising heads is a process I have employed for some time now on all my cassette heads. The process is simple, quick and effective, however, a word of warning to newcomers to this practice: Do not allow the demagnetiser to come any nearer than two feet from any cassette whether it is in or out. This is because the demagnetiser will do more than its job, and will erase any information stored on the tape. I found out the hard way.

Gavin Gossain

Edwin

London

Too long

AS Brian Cudge stated in reply to a reader in the February edition of Dragon User, the values of the joystick are updated only when JOYSTKIN is used.

The subroutine called when JOYSTKIN is used reads as follows: Therefore, rather than using:

10 A = JOYSTKIN: JOYSTKIN = GETS 10

which takes twice as long as necessary, try using:

10 EXEC=8012

20 EXEC=JOYSTKIN: GETS 10

20 540010 = 32768

Secondly, if you need a complete memory map then I suggest you contact Hison Computer Services. I bought one for £5 and I found no less than 571 useful locations.

David Somerville

Gateshead

Type and View

Simple stop

A ROUTINE to stop the LIST and UNLIST functions was given by Brian Cudge in the March edition of Dragon User.

This routine was some 14 lines long. A simpler method is to include this one line: POKE 263, 158: POKE 157, 158: POKE 154, 0.

This line can be hidden in the program with a GOSUB at the beginning of the program. Further, if the program is auto-run, this routine is operated straight away.

Peter Cough

Amnion

London

Black on orange

I HAVE perfected a short machine code routine which gives the Dragon 32 a black on orange display. The Basic program to load it is as below:

10 FOR A = 32768 TO 32769

20 READ A

30 POKE A, A

40 NEXT

50 POKE 263, 137

60 POKE 264, 246

70 POKE 262, 136

80 DATA 134, 12, 150, 255, 34

90

To disable the effect, type POKE

262, 57 and to re-enable it, type POKE 262, 135.

Dr A. Poyser

Exeter

Switching on

I REFER to the many queries that your magazine has received regarding the use of tape recorders with the Dragon. When I first tried to use my tape recorder I found a problem which though easy to cure, is common to many cheap recorders.

The problem is with the remote control switch. Most small tape recorders operate so that the switch controls both the motor and the amplifier. When the power is supplied, the amplifier takes a little time to become active. If the computer starts sending information during this period, it will be lost or distorted. The solution is to alter the wiring so that the switch only controls the motor, and the amplifier is left permanently on.

Chris Jolly

Green Park

London

Mis-hash of Mash

MASH has smashed won the apt comment from one of the many readers who contacted us complaining about the errors in the program listing Mash (Dragon User, April).

Unfortunately we have still not been able to remedy this problem program and must apologise for all the frustrating hours many readers have spent attempting to get it to work.

However, we are trying to get the program to work and if we're successful we'll send the corrected listing to readers who have contacted us.

If possible, we'll also publish the new listing. Look out for further announcements on this page.

Once again, our apologies for this program which was only published due to an administrative oversight.

We play readers' programs before accepting them, and then we LIST them — but unfortunately the system broke down for Mash.

Software Top 10

1	(1) Dragon Chess	Classic Software
2	(2) Hungry Horace	Melbourne House
3	(3) Chuckle Egg	A&F Software
4	(4) Ugh	Softek
5	(5) Pedro	Imagine
6	(6) Eightball	Microdeal
7	(7) Kongsapal	Beyond
8	(8) Curious In the Jungle	Microdeal
9	(9) Up Periscope	Beyond
10	(10) Frepper	Microdeal
	(11) Skreamline	Microdeal

Chart compiled by Websters Software



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On your marks for next micro

THE NEXT micro from Dragon Data is expected to include a built-in modem and 3½-inch disk drives.

The 64K machine, which will run both Microsoft Basic and CGA programs, comes with one or two 3½-inch floppy drives, as well as more expensive options such as the Apricot, as well as the modem.

The transportable package, with on-board power supply, is

expected to sell for about £700. It will make its public debut at the Consumer Electronics Trade Exhibition at Earls Court in May.

Production samples are expected to be available to the public in August/September, but dealer trials will be conducted first.

At the time of writing little more was known about the new machine. Dragon Data

was reluctant to release further information until final details and launch plans had been decided.

Managing director Brian Moore explained that the package is being marketed as part of Dragon Data's belief that micros should be "communications based" — that is, future computers will have to contain communications hardware as a basic requirement.

Brian Moore woos the electrical retailers

MEMBERS OF the Radio, Electrical and Television Retailers' Association (RETIRA) Limited were treated to an informative and light-hearted speech on the home computer market by Brian Moore, managing director of Dragon Data (a GEC Dragon %), at their recent annual conference in Torquay.

Speaking about the computer market in general, while displaying Dragon products on the overhead projector, Brian commented that, "The home computer, together with all its support products, represents a retailing opportunity that cannot be ignored. The technology available, together with forecast explosive growth in home communications and information technology, will result in every retailer having to deal in computer-based products in order to survive."

Strong words indeed, and all part and parcel of GEC Dragon's intention to market products through the citizens' marketers — the independent retailers (see Dragon User May 1984).

Brian was not the only speaker to discuss the future implications of advanced technology, several others spoke of the need to sell a complete configuration of equipment — TVs, computers, videos, hi-fi and so on.

Accumulating knowledge of the various systems in order to give customers "expert" advice was also advocated. "I strongly recommend you get



Brian Moore speaking at the RETIRA conference

basic keyboard skills," said Brian, imploring retailers to buy a computer, use it for their accounts and then to go around selling it on their personal recommendation.

On the subject of the present home computer business, Brian said it was "totally crazy" consisting of seventeen-year-old millionaires and big businesses failing to make a profit. Businesses producing peripherals, utilities, software and magazines were making money according to Brian, the only people who weren't were the actual computer manufacturers.

This is the key to the computing world. As owners of the Dragon know, the money on its own is not much use. To be of value, you need a complete package — which is what Dragon Data is now offering. Its display table at the conference consisted of the Dragon 64, a GEC McMichael TV, the OS-8 operating system, Dragon disk

drive, peripherals, three cassette-based games, and several pieces of business oriented disk software.

It is the small business user that is targeted as the future growth area. Dragon Data's research has indicated that micros sell for the following five main reasons: games, curiosity/impulse, education, hobbies and business. The latter, it is expected, is the key market with games being the most uncertain one.

Future product specifications should be based on the following criteria: communications based, good "friendly" software, well-packaged, compact and expandable with wider capability.

With this in mind, Brian "unveiled" (on the overhead projector and to the joy of a "party political broadcast" on behalf of Dragon Data) the new, transportable all-in-one computer package from Dragon Data due out sometime in the near future.

Extra clubs

THE growth in computer clubs continues with the news of several more additions to the Dragon clubber.

Electronics teacher Tony Walsh has set up the Oldham Computer Users Society at Goldthorn Community Centre, Dunbar Street, Rochdale Road, Oldham. The society has 80 members (20 of whom are Dragon owners) and a Dragon (only evening) is planned when membership and enthusiasm indicate the necessity.

From Gerard Cornsweat comes news of the Ellersmere Port micro group established to promote awareness of microcomputers and their use on Merseyside and to bring together current and potential micro users. The club meets every second Monday and has a regular newsletter. Further details from Gerard on 051-337 3612.

Further afield, Edward Coak brings news of the North Down Microcomputer Users Club in Bangor, Northern Ireland. The club is open to users of different flavours though at present the largest group within the club are Dragon users. (There are 81 Dragon 30 users and four members with a Dragon 64 making a total of 85 out of a club membership of 105.)

More information can be obtained from Edward on 0247-580602 and he suggests that any Dragon user thinking of joining should contact him as soon as possible as the club may have to put a ceiling on membership.

Finally from Europe, Maarten Van Wassen writes about the Dutch section of the Dragon Users club, Gifkruis, Belgium (phone 050-630885) and from Hans Christian Andersen of Andersen Computers, distributor of Dragon Data products in Denmark, comes information of an independent Danish Dragon User club run by Kenneth and Tonny Christensen, Tofte 318, DK-5330, Munkebo, Denmark. (For a complete listing of the Dragon clubbers send a large SAE to Dragon User.)

Chess wager

DAVID LEVY laid down the gauntlet — £500,000 that no computer could defeat him in a chess match. *Omniscience* magazine underwrote \$4,000 of the wager. OGC Oregon sponsored the tournament and the scene was set for the battle royal between the Cray XMP, one of the most powerful machines in the world and holder of the current world computer chess title, and David Levy, Scottish chess champion, author of the *Chess Computer Handbook* and writer of the *Dragon* chess program from Oregon Data.



David Levy takes on the Cray.

The challenge matches, held recently at Brunel University, were a victory for mankind. The electronic challenger was soundly defeated and David reckoned it will be another 20 years before a computer will be able to beat a world-class international chess grandmaster. Only time will tell.

Software challenge

FACED3 Doom, the evil Solidad or even a putative Dennis Lillies are some of the choices offered by the latest batch of software for the *Dragon*.

From Pasadena Software comes news of *Castle of Doom* (£5.95), a graphical adventure containing 80 locations, and pitting you against the dreaded Count Doom; and *Sparring Decathlon*, in which you compete in the 10 traditional decathlon events. In the track events you are down in time one racing against two competitors, and in the field events you are the sole competitor.

Hewlett Consultants has launched 3D Lunastack, the third game in its space war epic. Flying a Hoverfighter over the hostile lunar landscape, you have to destroy the Solidad command base to end the tyranny of the evil Solidads. The game retails for £7.95 and, as in the other two wars, is played in 3D. Hewlett is also intending to flood the French market with its space war series — it has won a contract with the French publishers of the *Dragon* to supply the trilogy to over 300 outlets throughout the country.

Pedestal presents you with the opportunity to test the wicket in its latest release for the *Dragon* — *Tim Lott's Cricket*. The game features complete joystick control over

batting, bowling and fielding, with the bowling and batting action shown in full-bodied animated graphics. There is a choice of skill levels — Village Green, County and Test matches, a save option to build a library of teams, a bowling practice option, updated bowling averages and scoreboard. Cricket costs £9.95.

Other releases, being given the final finishing touches at the time of going to press, include *Polaris Rescue* from ACS, distributed by Mutual Video, and *Operation Saurus* a "prequel" to Pettigrew's Diary by Shards Software.

Polaris Rescue (£5.95) concerns the rescue attempts of a British team thwarted by the Russians while trying to stage a downed submarine containing a nuclear reactor set to explode at a given time, while *Operation Saurus* (£7.95) describes the events leading up to the farm house scene in Pettigrew's Diary. It is a three-part adventure using original graphics and making extensive use of another of Shards programs, *Shaper*, to show the sounds you can obtain from the *Dragon*.

Disk drive

ALPHA Disc has enhanced the Canon 4080 track disk drive making it "even easier for unsophisticated users to install, and also extra safe in any 'hostile environment'".

The basic MDD 221 has an LED which shows a green light when the drive is ready for use, and a red light when the head is loaded/drive selected. To this the company has added a built-in 40 or 80 track LED indicator and secondary switching power supply.

The enhancement develops the two signal structure into a four signal structure; a dimmed green light signalling power on, a brilliant green light denoting 40 track select; and likewise a dimmed red light shows that the power is on and a brilliant red light denotes 80 track mode selected.

The secondary switching power supply it is claimed both avoids the problem of head generation through the standard linear power supply and the expense of screening result is associated with switching systems.

The disk drive with enhancements, the Canon MDD 221A10, costs £224 when operating off the computer's power and £264 for the model with secondary switching power. It is available direct from Alpha One of Unit 2, Crabtree Road, Thorpe Industrial Estate, Egham, Surrey.

Grafpad

BRITISH MICRO's Grafpad graphics tablet, originally available for the BBC micro, is now compatible with the *Dragon*.

The Grafpad (price £105) allows you to draw designs or trace the outlines of maps and pictures. These can then be saved to disk or cassette and copied through a printer.

Based on the ULA chip, the

Grafpad has a working area of 240 x 160mm with a resolution of 320 x 256 pixels. It comes with a free-hand drawing program called Draw, a detachable pen and a choice of three colours (red, green and blue) on a different coloured background.

The Grafpad is available direct from British Micro, Penfold Works, Imperial Way, Watford, Herts.



"It is user friendly" but Stanley hasn't learned to talk to it properly yet!"



Dragon software on the up and up

John Screen's task is made more enjoyable as the quality of games steadily improves, and now he is broken into the Dragon's software

SINCE THAT far-off day in 1982 when I first looked at the tentative offerings for my shiny new machine, I must have seen something like 300 programs for the Dragon. I often wish that programmers could have also seen these, so that they didn't try to reinvent the wheel. If there are already 10 perfectly good versions of Alien Spat in the market, producing an eleventh is a waste of time, and changing the shape of the invader hardly counts as original.

Brainwaves

What is needed is an input of new ideas and Dragon owners are lucky that these have at last started to appear. Although there are some long-standing favourites, a novel program often leaps to the top of the software charts. (Witness the success of Art Attack and Mario Miner for the Spectrum.)

When I see the unpleasant sight of invaders I can only feel sorry for the person who spends their hard-earned cash on something they've already got, sorrow for the firm that has wasted its programming expertise for nothing and sorrow for the stagnant state of the industry.

However — a breath of fresh air has been blowing along this poor reviewer's corridor, and this month a bunch of superb programs arrived on my mat.

Thinking of Spectrum pro-

grams like Mario Miner reminded me of one that cost me many hours of sleep when it appeared 18 months ago — **Hungry Horace** from Leisure House. Perhaps programmers were put off by the Dragon's 6800 processor; whatever the reasons, there have been fewer fast games with interesting graphics than for the Spectrum and Commodore. If Hungry Horace has indeed taken 18 months to convert, then it's been worth the wait.

Your job is to control Horace, an endearing little character who has an insatiable large appetite. He runs along paths in a park devouring everything in sight. There are bridges and tunnels, and just to make your task a little more difficult, some park-keepers are out to catch you and throw you out of the park. Once you've reached the end of one section, you can go on to another that is different in shape.

If you steal the alarm bell in any of the sections, the guards rush out in panic, dropping their lunch pails. Naturally enough, Horace will eat these with relish and increase his score. If you're lucky enough to be caught, then you get thrown out at that section of the park. Control is by means of the cursor keys or a joystick, and the graphics are excellent.

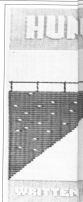
If you like maze chasing with a difference, then I can

heartily recommend Horace. Perhaps Monsteel's Gylbert has a new rival, and soon Horace will be doing as fighting spiders like he does for Sinclair owners.

Just as Horace is a friendly game, and neither Horace nor the park-keepers get particularly damaged, so **Pedro**, from Imagine, is a mild-mannered program. In fact, the only creature to suffer are misbehaving garden pests. Pedro is an unfortunate Mexican who has a beautiful garden full of flowers. He is unfortunate, because everyone from miles around has heard of his prize flowers — including cats, lycuists and the village tramp. Pedro can block paths with bricks, chase the invaders and even stamp on them, but they still end up with his plants. He can plant seeds and move compost and bricks, as well as run and jump, but he can only do one thing at a time.

High quality

The screen display is good — a 3D view from above and to the side, and has a lot of detail. This is the second Dragon game I've seen from Imagine, and has apparently been released at the same time as versions for other computers. Although the subject may not sound too exciting, Imagine have produced a game of high-quality, and it's a pleasant change to see a fine game from a software house on this side of the Atlantic.

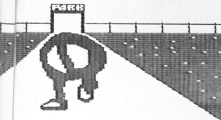


After months of waiting, Hungry Horace

Mad Monkey from Screenplay is not really in the Pedro class, but is still an interesting game to play. You control a sithering python that needs to devour frogs, toadstools and magic mushrooms that alter a garden. There are different speed levels, and as you consume the various delights, the length of the snakes increases, thus making it difficult to avoid crashing into the walls or indeed sections of your ever-lengthening tail. Although it's not a bad game, the slow keyboard rates of the Dragon means that control is not all it could be, and it takes a while to learn the tricky art of snake control.

Another program that involves creating a sithering across your screen is **Ultirapide** from Softex. In fact, a fairly good version of Caterpillar. The Ultirapide rushes down the screen at top speed (at higher levels it resembles an express train). You can move your position by control keys or a joystick, and you have to avoid the Ultirapide while shooting the

HUNGRY HORACE



BY DAN BEN COPYRIGHT

is finally available for the Dragon — and on page 62 you can win a free Horace game

mushrooms. Destroying the Ultraspide is difficult, as when you shoot it, the separate sections continue to move on their own, and finally the final makes a great appearance dropping tiny soldiers that cannot be destroyed. If you like high-speed garden pests, and are a fan of the Magic Roundabout, this could be just what you're after.

One of the most intriguing

games on offer this week is *Snail* from Dragon Data. This is nothing to do with the snail investigator with a sharp line in leather raincoats, although you can choose to play the part of Buck Ford or James Bond in the game. The object is to dodge blue liss that move up and down the screen while moving a snail figure across to reach the far side, where you can take a yellow liss to the

next level and attempt to get back to the other side. Gaining points all the time, you eventually reach the top of the screen. However, all is not as it seems, and avoiding the liss is very difficult.

You may like the challenge of a game as difficult as this one, but it does seem to be pitched towards the top of the difficulty tree, and there seem to be small rewards for all the frustration.

About three years ago, someone in a dark corner of Japan who clearly enjoyed watching old American movies decided to write an arcade game about a giant gorilla which had captured a girl. Although computer graphics aren't up to portraying the assets of *Fay Wray* (or *Jessica Lange*, for that matter) to their full, the game took off. Unfortunately, the programmer was more used to *Murphy* characters than western letters, and instead of calling it *Monkey King*, he called it *Conkey Kong*. This was born the entire generation of *Donkey Kong* dodging figures clambering up

the scaffolding to the top of the Empire State or Twin Trade Towers in Manhattan to rescue the damsel in distress. This game has been criticized by feminists as being typical male chauvinist fantasy. To counter this claim, you might have expected a version whereby a woman is portrayed in the role of rescuer. Instead, what emerged was a game in which the gorilla liberation front sent in their best fighter, none other than King's son, Junior.

Dragon Data calls its version *Junior's Revenge*, and it is a very good copy of the arcade game. Luigi has captured your father, King Kong, and you have to rescue him from his cage. Normally a simple task, this is made more complicated by the trained animals Luigi employs to frustrate your task.

Captive

The first screen is comparatively simple, and consists of various islands and vines that enable you to reach the cage where your daddy is held captive. Swinging across with your joystick, you can reach the second screen which involves passing keys into place while climbing up long chains. The third screen is like the first, but the fourth has conveyor belts and trampolines to confuse you, and after some repetition you will eventually arrive at the killer — screen seven, Luigi's helmet. This has both conveyor belts and sparks to avoid, and you may eventually be allowed to get close to releasing your father.

This is an excellent copy of a good arcade game, and has a choice of practice or real games. A difficult game to master, this is one that should be included in any serious collection.

The next game I looked at would have sold well two years ago, when a little island in the South Atlantic absorbed most of our attention. In many ways, I'm glad this game has only just appeared, as modern warfare and video games have approached each other to the level where they are sometimes difficult to tell apart. *Jump Jet* lets you at the controls of a Harrier fighter. You control the movements by means of the joystick, and are instructed to fly the plane through a wave of enemy bombers attempting to knock out the airstrip to an island.



Watch out for Terry the Phantasmagor in *light*

When you win the online battles, there are 10 lives, ranging from difficult to nearly impossible, and the game includes speech synthesis at a rather rudimentary level. "Get lost" is kept muffled at me until I realized it was saying "jet lost." It also calls out "attack" through your in-breaker with something approaching the clarity of an air-raid siren system.

Flying High

In spite of my earlier reservations, this is an exciting game, although the wrap-around screen is irritating when you fly off the right-hand side of the screen, you reappear on the left side, and the display scrolls so slowly that the effect can be rather disturbing. Certainly it will take a lot of skill to fly to the island and destroy the enemy.

As you start with eight planes you could imagine that your task would not be too hard. In fact, the attacking planes are capable of bombing the runway and destroying remaining planes, so you also end up with less information as the game progresses. The difficulty is set by your ability to succeed at each level, although the strategy can be set at the keyboard. Pressing the reset button allows you to change the initial level again. (Level nine gives you two planes on the runway, so you don't stand much chance of even leaving it.) The strategy could be smoother, but the game is entertaining and fairly novel.

Although it brings back sad memories of recent naval campaigns, if you can forged the connoteations, you may find this game a suitable addition to any collection.

My taste-sensors award this month's title to go to Hewlett-Packard's **3D Space Wars**. Last year, they released a taste called *Dragonfly*, which was a computer, if rather elementary flight simulator program. **3D Wars** is also a flight simulation program, but one that has indeed come of age. This program gives you the feel from the cockpit of a specification jet against a fleet of Stealth fighters. Your mission is to destroy them while maintaining a reasonable level of fuel.

The screen is full of the enemy ships swooping and diving at you in a most realistic manner. All the while

you are firing at them, they are shooting back, and your fuel reserves are getting low. The solution to this problem lies in locating a refueling vessel that you must line up in your sights. How better than those of you foolish enough to blast it with your lasers? The whole secret to this game lies in locating the refueling vessel every four minutes or so and then to shoot you of it.

Without realizing it, your best friend is over a fifty-fifty chance of being downed to failure. The screen displays in superb, with exciting triple booming as you and me increasing in size as they approach, all while as shell-barrons on the nose of your ship and laser shots that are aimed prospectively. Although the combined forces of the battleships, ships, fleetable leaders, is always more than mortal man can face, However Consultants have produced an excellent game that forces you to bend the rest of the family away while you turn up the battleships and are poised in inter-galactic battles. Definitely my favourite games of the month.

Any one that calls a game "light" can't be all bad, and *Snakes* have recently unveiled a program that goes by this inauspicious title. Although early man had needs to contend with man-eaters and snake-bites, like the film *J. R.R.R. 3-00 years. B.C.*, this game gives you the opportunity your forebears never had — being chased by Phrynosaurus and T-Rex's while pinching eggs from the basket.

Table 1

The screen shows a couple of zig-zag paths with three labels: "You control the hero, called Light and steer him to the pile of eggs. On the way you may meet Rex, the Tyrannosaurus, but if you're not carrying any eggs you can throw a spear at him. While this is going on, Terry the Parrotachick is dropping rocks on to your head. You have four lives, and there is only one space on the screen that is safe — your home cave. As you spend more time escaping from Rex, you longer in the air, and an angel look up in the air, and an angel think sound comes from the speaker. This is a novel game that is fun to play, and there are comprehensive instructions at the start. There are several different screens and 16 bit sounds that change.

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Table 1

Immediately as you improve, so you will be unlikely to tire of *Light* too quickly.

Also from Softdisk is *Galactica*, so you can guess which arcade game this is supposed to represent! Hordes of whirling ships descend from the top of the screen, while you race left and right along the bottom avoiding them and frantically firing your laser. When you clear one screen, you are confronted by... just another screen with more of the unpleased creatures.

There is on-screen scoring, rather nice sound effects, and the display is reasonably clear. Why then should I sound as if I have my doubts? I enjoy well-written fast space games, but this seems almost as boring as *FV'D'RS*. There doesn't seem to be much point in playing again, and it's not likely to be the kind of game that involves many different skills. The sort of space game that I'd pay money to play in an arcade would have to be something of the calibre of *Moon Cresta* or *Defender*, and however well *Galactica* may be written, it looks a little old-fashioned and lag against the latest Dragon games.

Lottoloni have been producing war games for the Dragon for some time now, usually set in the past. *Johnny Hawk* is no exception, and as the name implies, is set during the time of the American Civil War. You can use the computer merely as a display screen and play against another human, or you can pit your wits against the computer itself. There are several options available at the start, including whether you wish to fight for the Yankees or the Reds, and how you wish to divide up your army into artillery, cavalry and



Play James Bund or Ruck Furd in *Shall*

infantry.

When play starts, you are shown the playing area, with a river running down the middle. Your troops are arrayed on one side, and the computer's on the other. You can move your pieces around the screen as well as firing the artillery pieces, and the game is over either when one side's flag is captured or when a pre-selected time limit has expired.

Fire

Having seen previous Lottoloni games, I was expecting some exciting graphics during the interchanges, but apart from the odd cannon-ball whizzing across the screen, nothing much happens, and the responses at higher levels are rather slow. If you are a serious wargamer you will probably feel this program entertaining, but it didn't interest me as much as *Tyrant* of *Athens* and *Samurai Warrior*.

Shall is well-known for its series of educational and adventure programs. This month I've been looking at something completely different from them. *Shaper* is a sound utility program that allows you to define your own sound effects and store them for use in your own program. The package contains the main program together with a library of pre-programmed sounds. As the Dragon does not have its own sound chip, some manufacturers have produced add-on devices. The problem (pointed out in *Shaper*'s documentation) is that programs written to utilise these will only work on other Dragons that also have the sound board.

Based on a sound idea (sorry!) how does the program perform in use? Firstly, it's simple to program your own sounds. After the rather noisy opening screens, the initial menu appears, giving you the

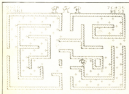
choice of explanations, assistance, listening to the library and building your own sounds. If you select "build" as an option, you will be given instructions and then shown a list of the 10 parameters that have to be entered. These include squares, expand, and chain, as well as the more usual volume, frequency and envelope values. At any time you can press the space bar to listen to the sound so far.

Select sound

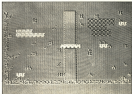
When the sound is to your satisfaction, you can select the save option and store the sound effect on cassette. You can now enter the program you wish to employ your sound in, and last in the effects at the end. If you prefer, you could use one of the sounds included in the library. Some of these are quite amusing, and vary from UFOs and tank battles to fairly meticulous synthesiser sounds. At the end, you are shown how to use the start of the Basic program to load in graphics and title pages with your own program.

Accompanying the program is an A6 booklet (a quarter the size of this page), with 26 pages of detailed notes and diagrams. This is very well written and makes using the program simple. As it is said if all else fails, read the manual. In this case, the program is well documented internally, but the booklet adds the finishing touch to a very fine utility.

When the Dragon first appeared, I'm sure that many people bought it because of its "real" keyboard. They probably imagined that it would be useful as a word-processor, and as a text storage medium.



Were chasing with a difference in *Hungry Henry*



Pre-appearing hawk in *Johnny Hawk*

Unfortunately, when they arrived home with their new toy, they were rather disappointed to discover that it didn't have lower case on the screen, and the display was only 32 characters wide. Word-processing programs have appeared that tried to cope with these problems by redefining the character set and reformatting the screen. Mostly, however, they are expensive — like the Microtext version.

There are some programs about that put up with the Dragon's limitations and attempt to use the computer as it is. One such program came my way this month, **Editor**, from NeXTware. In fact it's really two programs, as there is a disk version included on the cassette of no much use.

Options

On loading, the initial display is a menu with nine options: new text, view lines, edit, reformat, print, save, load, line editor and end. The text is entered in one large column, and the program takes care of word-wrap, so you don't have parts of words hanging over ends of lines. If you view the text, you discover that each line has been given a number, and they make line editing easier. The program can store up to 400 screen lines, which is somewhere about the odds of 44 point-out. Most of the menu options are fairly self-explanatory, and there is an A8 booklet containing 16 pages of clear notes.

There is a separate printer menu giving the options of draft or formatted print, and the opportunity to change printer format and typeface. The formatting commands include all the usual ones of left and right margins, line spacing and number of copies. You can also choose to have the text justified (spread out so that the words touch both left and right margins), as most magazines and newspapers are arranged. If you choose to go to the typeface menu, then you can change the size and design of the letters according to your printer. On loading, it is set up for the Epson FX-80, probably one of the most popular printers around at the moment.

I've usually been disappointed by the word-processor packages around for the Dragon, and the only good ones seem overpriced.

It's clearly unfair to compare Dragon programs with those designed for a machine with 80-column display; however, **Editor** is easy to use and reasonably cheap. If you can accept the disability of never seeing your formatted text until it issues both from the printer, then you could not hope to jump for this program.

with plug-in cartridges, but the programs you write will only work on machines that also have the cartridge. The same is true of graphics enhancers: if you use a purely software-based utility, you can transfer the programs to any Dragon. The main program consists of some machine code that is loaded at the top of memory,

more modes, where sports zero phrases or the others or vice versa. There are a whole set of new error messages, enhanced sound commands and even a scoring feature, so games are very easy to implement. These are described in detail in the 24-page booklet that comes with the package. The set of commands are more comprehensive than in any other utility I've seen, and include more than you get on, say, *Samurai Blade* for the Commodore.

One of the nice features of this package is the collection of demonstration programs. The first simply shows large characters floating around the display. When you press the break, you discover that the whole character set has been redefined four times as large, so pressing 'a' looks rather strange. The next program gives you normal sized upper and lower case as well as the opportunity to redefine all the character set using number control keys on a large grid.

Program three lets you output five sounds, and number four shows a large chess board with moving pieces that execute "foo's mate". The winning process even jump up and down after their victory! Program five lets you shoot at some foreground blocks that drift across the screen, and number six is a version of *Breakout*, where you attempt to smash a ball. The final program is a maze chase game that demonstrates sprite control. This is a very professional program and can certainly be recommended.

Coming soon

Next month I hope to look at some more sprite utilities as well as the latest games, two language packs — Pascal and Fortran — and also a compiler to add some 20 to your Basic programs.

I find it hard to believe that for two months now I've been faced with such good and varied software. Instead of being the poorer relation in the family of micro owners, compared to their Sinclair and Commodore cousins, Dragon owners now have as large a choice of quality software as anyone else. The problem must be which programs they can live without. There are many excellent programs on the market and their standard is improving all the time. Let's hope it continues to do so. ■

Hungry Horses £3.95	Melbourne House Castle Field House Castle Field Riverside TW10 6TF
Pedro £3.95	Imaging Software Tinsford House Tinsford Street Liverpool L4 2HF
Shift Jump Jet £7.95 each Junior's Revenge £10.95	Dragon Data Kings Industrial Estate Margam Port Talbot
3-D Space Wars £7.95	Hewson Consultants 48 Grand Parade Brighton East Sussex
Ultraspade Light Galacticans £5.95 each	Soflex 12103 Herwicks Street Convent Garden London WC2E 8LH
Johnny Rax £5.95	Lathorian 104 Park Lane Plymouth Devon
Shaper Data	Shards Software 108 Eton Road Barnet Herts
Editor	NeXTware s/s
Sprite Magic £17.25	Knight Software 93 High Street Eaton Middleborough Devon
Mad Manly £7.50	Screenplay 134 St Vincent Street Glasgow G2 5DU

Friends of yours who own Commodore 64s probably boast about their wonderful facilities, including upper/lower case and sprite graphics. I'm sure that you point out that the Dragon has a much better copy of Basic and is a lot easier to program. Now you too can have sprites and lower case on the Dragon if you own a copy of **Sprite Magic** from Knight Software. With sound utilities, you may possibly get better effects

and look by adding extra key words to Basic. Once this is loaded, you can write a normal program to use the new words or look at the demonstration programs.

There are over 40 new statements that are very comprehensive and allow you far more than simply defining up to 128 different sprites and moving them around the screen. There is collision detection, movement control by keyboard or joystick, and



I **HAD WORKED** quietly in the attic lab of Professor Magabyte's old Victorian house when I got a call from the Chief on my two-way wrist modem and pocket computer. An anonymous tipster had revealed a clue to the whereabouts of that missing academic and genius-who hardware designer, for whom I had been searching for those many months.

On my desk was a British manufactured tape called *Maths Trek*, from Dragon Dungeon's Dungeon Software line of programs. Max had converted it to disk for me. According to the Chief, somewhere in this software would be everything I would need to find the long-missing Professor.

Since this program is designed for the Dragon 64/128 which I just happen to have a future 3.0 version of, I knew I would be able to get to work right away.

I really didn't know what to expect when I loaded up *Maths Trek*. Max wasn't there to tell me on the details. Here I been wandering the phone lines more and more, visiting data bases in storage places like Sandusky in Ohio, and Hull in England. Then it hit me — that sinking feeling I get whenever I am downloaded into the world of a computer program.

"Max — what are you doing?" I shouted in vain as I reentered in real time. There was no answer. He wasn't anywhere within earshot and I knew I was it for a rough time.

I reentered in the padded seat of a Klingon Class VII light attack cruiser, inside *Maths Trek*. Directly in my sights was the awesome, formidable heavy starship *USS Enterprise*, poised to tear, photon torpedoes armed, shields up and primed for battle. All this hardware was sighted on me, according to my special patented *Literalized* or *Discretization* Calculator and digital watch (which I never leave home without).

This universe was more bizarre than any I had ever visited in all the time I've known Max. Instead of asteroids in the normal sense, this space was littered with sculptured planetoids shaped like maths problems. There were rock numbers shaped into equations of addition and subtraction, multiplication and division. No could about a trouble had caught up with this.

It was at exactly this moment, when I believed matters could be no worse, that I heard a voice over the radio. It was Max.

"Bob, don't transmit, just listen. The

been kidnapped! I've downloaded you into the first program booted and encrypted sidelisp codes to access my prison. The message you face is greater than even that of cancellation of your column. Help me, Bob, the fate of the world is in your hands."

I didn't have time to respond or absorb the reality of the situation. Somewhere, someone pressed enter and the game was on.

Maths Trek is a basic language educational game from Pete Wood at Dragon Dungeon in Derbyshire. It combines the graphics delights of an arcade-illustrated simulation with the functionality of a rote-mathematics drill.

The *USS Enterprise* is powered not by deuterium crystals, as has been the case in other "trek" style programs, but by the answers to maths questions posed within the context of user-defined skill levels. An input of "45" to the question "15x7" would increase speed, repair damage, destroy enemies, and (not incidentally) remarkably increase the ability of the player to do higher maths.

Pete Woods is to be congratulated on his courage as it is a well known fact that everybody wants educational programs until somebody offers one. Then they gather dust in favour of arcade or other games.

Battle royale

Dragon Dungeon Software has created a marvellous, well organized unit of software. The presentation is superb, the intent (which is to teach maths), is well preserved. The packaging is pleasing to the eye, which should in turn please distributors and dealers. The end user will find, as did the father of a little lad in Wakefield, that schoolkids can't get enough of it. (I witnessed the battle royal to put these types to bed while they were still playing.)

Maths Trek suits all its obligations, as a reasonably priced competitor to what little other educational Dragonware is available. It is a shiny program that everyone with kids should have.

Often when I am downloaded into *Software Worlds* I become an equation in the universe. Rarely do I emerge on the antagonistic side (although I was once an invader in a *Space Invaders* game for the TRS-80 Model 1). Still, when faced with being scooped by enough phaser power to reduce Yorkshire to pudding, one must

use his wits or be supported. I opened a healing frequency.

Too late! A soothing bath of pure phaser plasma started against my screens (which fortunately held), severely jarring the interior of my steadily made ship and spilling Klingon tea all over the deck. The acid fumes of dissolving metal filled the pilot's cabin as the tea began eating through the floorplates. No wonder those Klingons are on everybody's case all the time.

"Jim, quick!" I snapped through the microphones, "beam me aboard!"

The surprise of hearing his first name jolted the Enterprise captain into action. I was beamed from my semi-disabled cruiser and whisked into the transporter room where a very astute Mr Scott nearly dropped his hand slammer in surprise to find a human (or, not a Klingon) materializing.

The doors to the transporter room whisked open and in stepped Captain Kirk followed by a short, pudgy, balding fellow dressed in a lab coat. It wasn't Dr McCoy or anybody that should have been here.

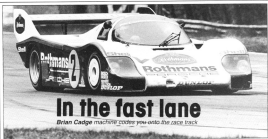
Then it dawned on me. I smiled, took a step forward and extended my hand.

"Professor Magabyte, I presume," I said. He seemed startled that I knew him. "Sir," I said, "we certainly have a lot to discuss."

In the crew's lounge, several days later, having briefed Professor Magabyte on situations past and present, it was decided that action should be taken to rescue Max. The Professor, using Federation Technology, had devised a *Manual Sidelisp Activator*, against the day when power failure or other disasters should befall this universe.

After bidding farewell to Captain Kirk and the crew of the Enterprise, the Professor set off the signal that would lead us to Max's prison . . . and his jailers.

In reentered a dark drive whirled and an encrypted algorithm activated the forces of sidelisp. The Professor and I reentered on the bridge of the starship and plunged dizzy straight down, through the depths of the very core of software time and space. We fell at a dizzying rate, plummeting through planets and stars, through invaders and defenders. Onward and onward we spun until I thought I would surely be it. For a time there was no sensation of motion at all. Then we slammed batter skelter into a darkness to end all darkness. We collided with a black hole.



In the fast lane

Brian Cade machine codes you onto the race track

GRANDPRIX IS A machine code game for one or two players using joysticks. Player one uses the right joystick and player two the left. When RUN the program will ask for the number of players — enter 1 for a single player game, 2 for a two-player game.

The program, which is about 1K long, uses PLOCEM to fetch colour graphics and realistic sound. The object of the game is to achieve the highest score in the three minutes that a race lasts. If you hit one of the other cars you will lose one of your three lives. The joystick controls left and

right movement of your car, while pushing the stick up will cause you to speed up and pulling it down slows you down. The sound of the engine indicates speed.

Being written entirely in machine code, the game is very fast, also very realistic: engine and crash sounds can be generated continuously at the same time as the graphics are animated. The score is constantly shown and the faster you dare go the faster your score will rise.

I have included two programs to enter and check the code. Once entered, save the program before running it.

To do this type: CSAVE "CAR". 28808,28163,28732 Type EXEC 28732 to start the game. Note: before typing in or loading you must type PLOCEM to re-erase the extra graphics RAM needed. If the game does not work, enter program 2 and check the data against the listing. Location 28808 contains the number of lives per game, set this with any value 1-255 to alter the difficulty.

As several ROM routines are used, the program will not run on a Tandy colour computer.

Happy racing...

```
10 *PROGRAM TO ENTER MACHINE CODE
20 PLOCEM:CLERAM288,27999
30 CLS:B=28808
40 PRINT B:LINE INPUT A:IF A="" THEN 40
50 IF A="END" THEN STOP
60 DIMA(1:"SA"4LEFTA:B,2):POKE B+2,B+0+1
70 A=RIGHT(A,3):IF A="" THEN 60 ELSE 40
```

Program 1: entering machine code

```
10 *PROGRAM TO CHECK MACHINE CODE
20 CLS:INPUT "ENTER 1 END ADDRESS":S:E
30 FOR S=0 TO E:STOP 1
40 PRINT:
50 FOR S=0 TO T
60 HEX=HEX$(S+J):IF LEN(HEX) THEN A=HEX+" "
70 PRINT USING "00000000";A
80 NEXT S:PRINT:GOTO 1
```

Program 2: checking machine code

GRANDPRIX GAME MACHINE CODE LISTING

START BY EXEC 28792

continued on page 33

```
28800 06 03 07 01 30 7F 71 70 7F 71 79 7F 71 7A 7F 71 7B 7F 71 7C 06 F0 07 01
28804 07 7F 01 13 06 23 20 0F 00 00 06 09 0F 0F 01 40 05 00 07 01 35 7F 01 3A
28808 0E 0E 0A 0F 01 42 0E 14 0B 0F 01 44 0E 1A 0E 0F 01 46 0E 05 07 7F 22 07
28812 7F 08 07 7F 03 07 7F 05 07 7F 08 07 7F 0B 06 7F 0C 08 06 07 08 0C 20 00
28816 25 F9 0E 08 06 06 0A 0C 0A 07 03 0C 01 16 23 F9 30 08 20 0C 20 03 25 27
28820 09 07 53 00 07 28 06 01 13 01 02 23 0A 00 0E 29 7D 01 3A 10 2C 01 11 0D
28824 2A 10 0E 01 40 0C 04 0A 0E 04 06 0E 07 38 08 20 0C 20 25 00 0E 05 0C 00
28828 07 3F 30 06 0F 04 31 22 5A 06 0E 00 0A 0C 16 02 0C 05 01 37 4C 0C
28832 0A 07 3F 30 06 0F 04 31 22 5A 06 0E 00 0A 0C 16 02 0C 05 01 37 4C 0C
28836 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28840 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28844 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28848 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28852 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28856 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28860 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28864 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28868 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28872 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28876 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28880 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28884 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28888 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28892 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28896 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28900 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28904 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28908 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28912 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28916 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28920 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28924 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28928 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28932 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28936 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28940 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28944 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28948 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28952 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28956 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28960 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28964 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28968 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28972 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28976 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28980 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28984 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28988 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28992 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
28996 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29000 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29004 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29008 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29012 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29016 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29020 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29024 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29028 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29032 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29036 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29040 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29044 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29048 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29052 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29056 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29060 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29064 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29068 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29072 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29076 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29080 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29084 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29088 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29092 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29096 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29100 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29104 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29108 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29112 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29116 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29120 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29124 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29128 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29132 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29136 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
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29164 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29168 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
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29176 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29180 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
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29188 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
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29204 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
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29364 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
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29372 0A 30 07 01 30 1F 26 FC 29 34 36 7F 01 13 0B 0E 52 7D 01 39 27 0C 06 01
29376 0A 30 07 01 30 1F 26 FC 29 34 3
```

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28744	8C	8C	71	87	25	F9	8E	6F	8D	8D	88	85	7F	81	39	8D	88	85	81	31	27	88	81	32	
28768	26	F3	86	81	87	81	38	28	83	7F	81	38	8D	8A	77	8E	85	88	3F	88	8E	6F	8A	8D	
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28984	8C	7F	FF	38	8D	87	86	37	87	8F	23	35	86	8C	64	58	26	7D	33	88	88	88	88	53	
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29080	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	
29104	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	
29128	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	
29152	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	
29176	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	

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PC88 (Vol 1) No 107

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In search of atoms

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ATOM HUNT is an absorbing game to test your powers of deduction. The game uses the Dragon's high resolution colour graphics to the full to give an eye-catching game-board display. Text on the hi-res screen is produced by a sub-routine which draws "computer style" lettering. Most of all, the game requires intelligence and concentration and becomes quite addictive.

What the program is run, an 8×8 grid is displayed. This grid (or molecule) contains four hidden atoms and your task is to locate these atoms. You have to deduce the locations of the four atoms by observing the deflections of light rays which you fire into the grid.



Figure 1: simple absorption

The computer does not reveal the path followed by a light ray — it only reveals the points at which the ray enters and leaves the grid. Each ray is represented by colored entry and exit markers. In order to deduce the positions of the four atoms, it is necessary to understand six types of motion.



Figure 2: simple deflection

Simple absorption: Any ray which strikes a hidden atom "head-on" is absorbed and does not emerge from the grid; the computer indicates an absorbed ray by placing a cyan disk marker at the ray's entry point (see figure one). **Simple deflection:** A ray cannot pass alongside a hidden atom — it gets deflected at right angles as shown in figure two. In this case the computer places two identical markers to show the entry and exit points of the deflected ray. **Reflection:** When a ray approaches a pair of hidden atoms separated by one square, as shown in figure three, it is reflected back on itself and emerges from the grid at the same point

that it entered. This reflected ray is indicated by a white marker disk.



Figure 3: reflection

Reflection at an edge: If a light ray is fired into the grid at a position adjacent to a hidden atom, the ray is immediately reflected and so it is shown by a white marker disk (see figure four). **Absorption, not deflection:** If a light ray strikes one of a pair of adjacent hidden atoms, as shown in figure five, it is absorbed and the computer marks the ray with a single cyan disk. (Deflection from the adjacent atom does not occur.) **Clear path:** A ray travels in a straight line unless it is reflected, deflected or absorbed.



Figure 4: reflection at an edge

The illustrations show simple cases of deflection and reflection. In practice, a light ray may be deflected more than once on its journey. You must make allowance for this when guessing the locations of hidden atoms. Figure six illustrates various possible light paths.



Figure 5: absorption not deflection

At the start of each new game the flashing cursor is positioned at the top left-hand corner of the grid. The cursor can be moved by using the arrow keys. To fire a light ray, first position the cursor anywhere on the border surrounding the grid and then press the "F" key. The computer

will work out the path of the light ray and place markers as appropriate. The cursor should now be moved to a new position in the border and a second ray fired into the grid.

Before long, you will be able to deduce the location of one or more of the hidden atoms. As soon as this happens, you may mark the suspected square by "setting" a marker in it. You do this by driving the cursor to the suspect square and pressing the "S" key. Should you later change your mind, you can delete these set markers by driving to the suspect square once again and pressing "S" a second time.

When you are confident that your four set markers represent the actual locations of the four hidden atoms you should press the "G" key signifying "that's my guess". The computer will now reveal the real locations of the four atoms by printing four squares in cyan.

For every atom you guess correctly, you are awarded 10 points. But you lose one point for every light ray marker you used. The computer calculates and displays your score. The "highest score so far" is also displayed. Score ratings are as follows:

0-14	Poor
15-25	Fair
24-29	Good
30-32	Excellent
33-40	Unobtainable

The game is written in PASCAL 3 to get high resolution with full colour. Text and graphics are mixed on the hi-res screen using a general-purpose sub-routine (line 1170) which writes any message, in any colour, at any screen position. The program is equipped with a full set of alpha-numeric characters of constant height but variable width which gives the display a touch of class. Readers may wish to adopt this character set for their own games programs. The procedure for calling the print routine is illustrated in lines 500 and 1130.

The full game display takes several seconds to draw and is contained in lines 100-210. To save tedium to repeat this procedure for each new game, a "clean" copy of the starting display is held in the compressed video RAM (pages 5 to 5 line 220). Then, at the start of each new game (line 240), the game display is copied down in the video area, pages 1 to 4.



Figure 6: various possible light paths

The main inner loop is from line 280 to 380. The flashing cursor effect is obtained by a sequence which GETs a picture of the current square, PUTs in a cursor symbol,

EDIT+

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

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DASM is a versatile assembler, designed especially for ease of use on the DRAGON and allows you to assemble machine code while still retaining the full use of BASIC. Supports all 6809 instructions and modes. Allows key length for labels (line first 5 and the last characters are used). Full support for output to printer. Recommended for the beginner. **£28.95**

DEMON

A powerful machine code monitor which allows you to delve into the internals of your DRAGON as well as helping you to debug your machine code programs (and BASIC programs using PEEK and POKE). Includes: Examine/Change memory, Examine/Change registers, Print Screen, Set Breakpoints, Find Memory. An essential tool for all machine code users. **£18.95**

DASM/DEMON

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

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The following BSBT programs are now available for use on cassette with the HI-RES II by 24 Screen: Database, Business Accounts, Stock Control, Invoice/Statements, Mailer/Address Book. Also available: Home Accounts, BSBT Card. **£19.95**

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• and PUTs back the original picture.

The keyboard is tested in line 270. Notice the use of the INSTR(L3,A\$) function. L3 is defined at the beginning of the program (line 50) and is a list of legal keyboard characters. The INSTR function searches through this list until it finds the character that was typed and assigns a value to K\$Y. Then, in line 280, the program jumps to the required routine or returns to 260 if no key was pressed. This is a general-purpose structure which can be used in many programs.

The string arrays for the draw shapes are:

NR\$B\$ Digits 0-9.
UL\$B\$ Letters A-Z + space.
MR\$B\$ Light-ray markers.

The GET/PUT arrays are:

SG\$B\$ Plain orange square.
CU\$B\$ Cursor (orange) ring.
ST\$B\$ Store, for cursor flash.
AT\$B\$ Atom set by player.
MS\$B\$ Missed atom.
AI\$B\$ Correctly guessed atom.
And the other arrays are:
MR\$B\$ Molecule array 1 = atom present.
GR\$B\$ Guess array 1 = atom set by player.
TD\$B\$ Turn factors for deflections.

Variables

MA Number of atoms (4)
MG Number of guessed atoms
SL Side Length of grid (8)
SC Score
HG Highest Score
AS\$ AT\$ OR\$ DRAW strings for Atom
MS Hunt like block
WS Word string for print routine
PS,PY Cursor Position (0-9)
DC Deflected coefficient
EF Exit Flag
AF Absorption Flag
VL,VY Velocity of light-ray
LG Light-ray color
TE,UN Tens and Units for score routine

Program notes

10-50 Initialization.
50-70 Read in DRAW strings for numbers and letters.
80-90 GET shapes for blank squares, atoms and cursor.
100-140 Draw scoreboard panel.
150-180 Draw whole gameboard.
190 Draw notice board.
200 Draw "Atom Hunt" title block.
210 Put in the 8 x 8 grid ...
220 ... and display everything.

230 Start new game — clear arrays and set up molecule.
240-250 New gameboard, initialize variables.
260 Flash the cursor.
270 Jump on his command.
280 Cursor up, down, left, right.
290 Get/set an atom.
300 Fire a light ray.
310 End of game + score routine.
320-340 Clear arrays for new game.
350 Set up atoms in a new molecule.
360 Set/reset atom.
370 Fire a light ray through the molecule.
375-390 Light ray turns left.
400-420 Light ray turns right.
430-440 Light ray is absorbed.
450 Light ray emerges, place markers.
460-470 Error message routine.
480-490 Hi-see print routine.
500-510 Hi-see light routine.
520 Set up light ray markers in array MR\$B.
530 Draw strings for digits 0-9.
540 Draw strings for letters A-Z.
550 Draw strings for Atom Hunt title block.

```
10 'ATOM HUNT BY PAUL HARMON.
20 'ISSUE 13 , JAN 1984.
30 CLEAR 2000:POKE4096:CLS4:PRINT @
233,"PLEASE WAIT.":
40 DIM NMR(17),LL$(26),H$(14),SG(25)
:AT(25),AO(25),AI(25),A2(25),CU(2
50,ST(25)
60 T(1)=1:T(2)=4:T(3)=2:SL=8:MA=4:
L$="":CHRS(74)+CHR$(10)+CHR$(8)+C
HRS(75)+"SFG"
70 FOR J=0 TO 9:READ NMR(J):NEXT J
80 FOR J=0 TO 36:READ LL$(J):NEXT
J:READ A$B,T$,O$,Y$,H$,U$,V$,W$
90 A$="R2ND3AND432DNL10D10L2NU3L
NU3L3U1NR10U10":PROCS,1:PCLS:LIN
E10,0)-(-11,11),PSET,BF:GET10,0)-(-1
1,11),SG,B:PCLS:DRAW"BMO,0:CB+A$:
GET10,0)-(-11,11),AT,B:PCLS:DRAW"B
0,0:CB+A$:GET10,0)-(-11,11),AI,B
90 COLOR 6,5:LINE10,0)-(-11,11),PSE
T,BF:GET10,0)-(-11,11),AO,B:COLOR 8
,5:PCLS:LINE10,0)-(-11,11),PSET,B:L
INE(2,1)-(-9,10),PSET,B:GET10,0)-(-1
1,11),CU,B
100 GOSUB 1250
110 DIM M$(SL+1,SL+1),S$(SL,SL)
120 PROCS 3,1:PCLS:CLS2:PRINT @ 23
3,"NOT LONG NOW":
130 FOR J=60 TO 136 STEP 38:LINE(2
9,J)-145,J+11),PSET,BF:NEXT J:DRAW
"BM32,62:CS$+LL$(62):DRAW"BM32,100"
+LL$(17):DRAW"BM 32,138"+LL$(7):CO
LOR 8,5:X=16:Y=76:W$="FINE":GOSUB
1180:X=20:Y=116:W$="SET":GOSUB
1180
140 X=9:Y=155:W$="SUSSS":GOSUB 1
180
```

```
150 COLOR 6,5:LINE(2,0)-170,41),PS
ET,B:LINE(4,2)-(-68,37),PSET,B:LINE
(2,1)-170,11),PSET,B:LINE(2,40)-(-70,4
0),PSET
160 LINE(2,53)-170,171),PSET,B:LIN
E(4,58)-(-68,167),PSET,B:LINE(2,54)
-(-70,54),PSET,B:LINE(2,170)-170,170)
,PSET,B:LINE16,92)-166,92),PSET,B:LIN
E(6,127)-166,129),PSET
170 LINE182,0)-(-254,171),PSET,B:L
INE184,2)-1352,169),PSET,B:LINE182,
1)-(-254,1),PSET,B:LINE182,170)-1354,
170),PSET
180 LINE(102,17)-(-232,150),PSET,B
190 LINE(2,178)-(-254,191),PSET,BF
200 DRAW"BMS,7:CB+A$:T$+O$+Y$+W$
+DRAW"BMS,23"+H$+U$+V$+W$+"B5)
1BL2UI"
210 FOR J=1 TO 8:FOR K=1 TO 8:K=10
0:O$=16:Y=23+13-1)+16:PUT(X,Y)=
(X+1,Y+11),SG,PSET:NEXT K,J
220 FOR J=1 TO 4:PCOPY J TO J+4:NE
XT J:CLS:SCREEN 1,1
230 GOSUB 360:GOSUB 410
240 FOR J=1 TO 4:PCOPY J+4 TO J:NE
XT J
250 X=70:Y=7:LC=0:SC=0:PC=0:PY=0
+NB=0
260 X=70+P$+16:Y=7+PY+16:GET(X,Y)
,Y1)-181+11,Y1+11),ST,B:PUT(X,Y1)-
181+11,Y1+11),CU,PSET
270 A$=INSTR6+KEY$+INSTR6$B$
280 FOR J=1 TO 20:NEXT:PUT(X,Y1)-
181+11,Y1+11),ST,PSET
290 ON KEY GOTO 260,300,320,340,36
0,380,390,410
300 PY=PY+1:IF PYCO THEN PY=0
```

Continued on page 27

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TANDY COLOR COMPUTER


```

310 GOTO 260
320 PY=PY+1:IF PY>SL+1 THEN PY=SL+1
330 GOTO 260
340 PX=PX-1:IF PX<0 THEN PX=0
350 GOTO 260
360 PX=PX+1:IF PX>SL+1 THEN PX=SL+
1
370 GOTO 260
380 GOSUB 670:GOTO 260
390 GOSUB 730:GOTO 260
400 'HE'S MADE A GUESS
410 IF NOGA THEN GOSUB 1120:GOTO
260
420 FOR J=1 TO SL:FOR K=1 TO SL
430 IF H(K,J)=0 THEN 460
440 XX=104+(K-1)*16+YY=23+(J-1)*16
450 IF G(K,J)=1 THEN PUT(X,YY)=(X
X+1,YY+1),A1,PSET:PLAY"DT200":S
C=C+10:ELSE PUT(XX,YY)=(XX+1,YY+
1),A0,PSET:PLAY"DT200"
460 NEXT K,J
470 IF SC=0 THEN SC=0
480 LINE(7,56)-(66,67),PSET,DF
490 DRAW"CS":X1=8:Y1=45:W="SCORE"
:GOSUB 1180:X1=26:Y1=83:GOSUB 1220
500 IF H5>SC THEN SC=H5 ELSE H5=SC
510 X1=20:Y1=116:W="TOP":GOSUB 11
80:X1=8:Y1=128:W="SCORE":GOSUB 11
80:X1=26:Y1=146:GOSUB 1220
520 X1=10:Y1=181:DRAW"CS":W="HIT
ANY KEY TO START":GOSUB 1180
530 A$=INKEY$:IF A$="" THEN 530
540 GOTO 230
550 ' CLEAR ARRAYS
560 FOR J=1 TO SL:FOR K=1 TO SL
570 H(K,J)=0:G(K,J)=0
580 NEXT K,J 590 RETURN
600 'GET UP MOLEHOLE
610 FOR J=1 TO NA
620 R1=RND(SL):R2=RND(SL)
630 IF H(R1,R2)=1 THEN 620
640 H(R1,R2)=1
650 NEXT J:RETURN
660 'SET/RESET ATCH
670 IF PX=0 OR PY=SL+1 OR PY=0 OR
PY=SL+1 THEN 710
680 IFG(PX,PY)=0 THEN G1PX,PY)=1:1N
6=H5+1 ELSE G1PX,PY)=0:H5=H5-1
690 IFG(PX,PY)=1 THEN PUT(X1,Y1)=(
X1+1,Y1+1),A1,PSET
700 IFG(PX,PY)=0 THEN PUT(X1,Y1)=(
X1+1,Y1+1),A0,PSET
710 RETURN
720 'FIRE LIGHT RAY 730 TIMER=0
740 X=PX:Y=PY
750 IFX>0 AND X<SL+1 AND Y>0 AND Y
<SL+1 THEN GOTO 1130
760 IFX=0 AND Y=0 OR X=0 AND Y=
SL+1 OR (X=SL+1 AND Y=0) OR (X=SL
+1 AND Y=SL+1) THEN 1130
770 EF=1:AF=0
780 IFB=0 THEN VX=1:VY=0
790 IFX=SL+1 THEN VX=-1:VY=0
800 IFY=0 THEN VX=0:VY=-1
810 IF Y=SL+1 THEN VX=0:VY=-1
820 DC=0 830 FORJ=1TO3
840 IF(X+VX=(J-2)*VY,Y+VY=(J-2)*V
Y)=1 THEN DC=DC+1*(J)
850 NEXTJ
860 IF DC=0 THEN 910
870 IFDC>3 THEN AF=1:GOTO910
880 IF DC=3 ORDC=2 AND EF=1 OR 1
DC=1 AND EF=1)THEN X=X+VX:Y=Y+VY:V
X=-VX:VY=-VY:GOTO910
890 IF DC=2 AND EF=0 THEN GOSUB 98
0:GOTO 910
900 IF DC=1 AND EF=0 THEN GOSUB 10
10
910 X=X+VX:Y=Y+VY:DF=0
920 IF AF=0 AND X>0 AND X<SL+1 AND
Y>0 AND Y<SL+1 THEN 830
930 T1=TIMER:IF T1<40 THEN 930
940 IF AF=1 THEN GOSUB 1040:GOTO 9
60
950 GOSUB 1060
960 RETURN
970 'LEFT TURN
980 IF VX=0 THEN VX=VY:VY=0 ELSE V
Y=-VX:VX=0
990 RETURN
1000 'RIGHT TURN
1010 IF VX=0 THEN VX=-VY:VY=0 ELSE
VY=VX:VX=0
1020 RETURN
1030 'ABSORBED
1040 DRAW"BM"+STR$(X1)+", "+STR$(Y1
)+AB$:SC=SC-1:RETURN
1050 'RAY ERASES
1060 X2=X0+5:Y2=Y1+16
1070 IF X2<X1 AND Y2=Y1 THEN DRAW"
BM"+STR$(X1)+", "+STR$(Y1)+AB$:SC=S
C-1:GOTO 1100
1080 LC=LC+1:IF LC>14 THEN LC=1
1090 DRAW"BM"+STR$(X1)+", "+STR$(Y1
)+AB$:LC1:DRAW"BM"+STR$(X2)+", "+STR
$(Y2)+AB$:LC=SC-2
1100 RETURN
1110 'ERROR MESSAGES
1120 DRAW"CS":X1=44:Y1=181:W="TOO
MANY ATOMS":GOTO 1140
1130 DRAW"CS":X1=10:Y1=181:W="CAN
T FIRE FROM THERE"
1140 GOSUB 1180:SOUND200,4:SOUND50
,4
1150 COLOR 6,5:LINE(2,178)-(254,19
1),PSET,DF
1160 RETURN
1170 'DRAW TEXT IN W@ X,Y
1180 DRAW"BM "+STR$(X)+", "+STR$(Y
):FOR J=1 TO LEN(W):Z=ASC(MID$(
W,J,1))-64:IF Z<0 THENZ=0
1190 DRAW LL$(Z):NEXT J
1200 RETURN
1210 'DRAW 2-DIGIT SCORE SIX,YY
1220 TE=INT(SC/10):LN=SC-10:TE:DRA
W"BM"+STR$(X)+", "+STR$(YY)+", "+W

```

continued on page 28

```

1270 RETURN
1280 'SET UP MARKERS
1290 A#(1)="80207B02B0C8NAU1R&D209
1300 U107BU1BL3ML&U1L&BL3":A#(2)=A#(3)+
"8020B207B2U7R207R2U7BL&BU2":A#(3)=
"8048R2R&D1L&D1R&D1L&BL2BU7":A#(4)=
"8048B207R2U7BL&BU2":A#(5)="8R&B
D4D3R2U3BL&BU4"
1260 A#="C&" + A#(1):A#B="C&" + A#(2)
1270 FOR C=7 TO 8:A#(C)=&"C"+STR#
(C)+A#(2):A#(C-2)=&"C"+STR#(C)+A#(2)
1+"C5"+A#(3):A#(C+2)=&"C"+STR#(C)+A
#(3)+&"C5"+A#(4):A#(C+1)=&"C"+STR#(C)
+A#(2)+&"C5"+A#(5):NEXT C
1280 FOR C=4 TO 8 STEP 2:A#(C/2)=&"
C"+STR#(C)+A#(1)+A#(3):A#(C/2+1)=&"
C"+STR#(C)+A#(1)+A#(4):A#(C/2+5)=&"
C"+STR#(C)+A#(1)+A#(5):NEXT C
1290 RETURN
1300 'DRAW STRINGS FOR NUMBERS
1310 DATA D7R2MU1R&U7L2ND1L2BR&R2
D7L2R&BU7BR&R&D3L&D4R2MU3R&BU7BR&R
&D7L&R&U4R&L2BU3BR&R
1320 DATA D&R&L2D1U2BU5BR&R&R&B3R&B
D&L2MU3L4U2BU&BR10,D7R2MU2R&U4L4BU
3BR&R
1330 DATA R&D7R2U7BR&R,D7R&U&ML4U3R
L&BR&R,D&R&D4L&R&U1R&U7ML&BR&R
1340 'DRAW STRINGS FOR LETTERS
1350 DATA BR12
1360 DATA D7R2U3R&ND3U&D1L2U1NL&BR

```

```

&,D7R2U4R&B&D4L&BU7R&BD3BR&R,D7R2MU&R&B
U1R&BU1NL&BR&R&R,D7R2MU4R&R&B&D1L2U2NL&L
&R&R,D7R2MU4R&R&U1BU3BL2L&U3BR&ND1BR&R,
D7R2U4R&R&B&U3R&ND1BR&R,D7R2MU4R&R&U&ML
2BU3U1NL&BR&R
1370 DATA D7R2U4R&R&B&U3BR&R,D7R2U4B
U3BR&R,D&D20R2MU2R&U7BR&R,D7R2U4R&R&U
3R&ND4BU3BR&R,D7R2MU4R&R&U1BU&BR&R
1380 DATA D7R2U3BU4R&R&B7R&ND7BR&R,D
7R2U4BU3R&B&D1ML2&B&U7BR&R,D7R2MU4R&R&U
7D1L2U1NL&BR&R,D7R2U4R&R&U3NL&BR&R,D7R
2MU4R&R&U1L3U&ML&BR&R,D7R2U4R&R&ND4L2U3
ML&BR&R,D3R&BU2NL2U1NL&R&D3D4L&R&U2L3
U2BU5BR12,R207R2U4R&U3H4BR&R
1390 DATA D7R2MU4R&R&U7D1L2U1BR&R,D&R
2MU3R&D1R&ND2R&ND1R&U3BR&R,D7R2MU4R&R
&U7R&U7BR&R,D&R&D20R2U4R&R&U3H&ND4B
&R&D1ND3BU2U2BR&R,D3R2&R&D2U2BU2R&U3
BR&R,ND1R&ND1R&D1DD1DL1L1D1NL1L1D1D
L1L1D1DL20R2MU3R&U4R&U1R&U3BU&BR&R
1400 DATA D11R2U&R&D1H&R&U11D&L2L2U
2L&D1R&U1BR&R
1410 DATA R10D1L1OR&D1OR&U7UB&R&R&R&R
1420 DATA D11R2U7R&R&U1ML&U1D&D&L2U2
L&D1R&U1BR&R
1430 DATA D11R2MU&R&U&ND1NL&R&B1QU1N
R&D1R&ND1R2D10BU11BR&R
1440 DATA D11R2MU&R&ND1R&D&U11BR&R
1450 DATA D11R2MU&R&ND1R&U10BR&R
1460 DATA D11R2U7BU3R&ND1R2L&BU1R&ND
11R&R&BU11
1470 END

```

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FORUM magazine
March Dec. 1985



Machine code routine for recovering files

Using 14 bytes of machine code Pam D'Arny explains how to recover a file before the dreaded IO ERROR strikes

A READERR threw down the gauntlet earlier this year, asking if it was possible to recover a file when Tapecon (February, Dragon User) shows that many blocks are perfectly alright before the dreaded IO ERROR strikes. Well, the answer is yes.

The key to this is so simple as to be almost unbelievable — 14 bytes of machine code that have appeared in many places including Dragon User (July's issue, under the deceptive title of "Loading Hex" for such an invaluable item).

The Basic program is read from cassette into memory starting at the memory address in location 26 (hex A419). (The value of this location depends on the last PCLEAR issued: PCOR 26.8 business.)

Instructions

August's issue described how Basic instructions are held in memory. You may recall that the first two bytes of an instruction contain the memory address of the start of the next instruction. Each instruction is terminated with a null (\$H00) byte. The end of a program is indicated by the two bytes following the last program instruction (that is the location pointed to by the address pointer field at the start of the last instruction) being set to null. During editing of program instructions, and execution of PCLEAR, which may change the start position of the Basic program, the linking address pointers within the instructions change. Recovery of Basic text is achieved by taking advantage of the Basic ROM code that resets these program address pointers.

The code given below is often referred to as a method of recovering a Basic program in memory if you have inadvertently entered NEW, only to perhaps then realise that the CSAVE had been ineffective (either the speeded up POKE was in effect or perhaps, as I have often been known to do, the second buffer was not set on the recorder — you name it, it can happen).

Typing in NEW sets the first two bytes of the program area (addressed by A419) to nulls. Providing that no new Basic instructions

have been entered (not, I assume, PCLEAR has been changed when those bytes were null as it would think that there was no text to be repositioned) the magical 14 bytes of machine code resets the program address pointers, including the first two bytes, and . . . the LIST reveals that the program has re-appeared. However — it is also the answer to recovering a Basic program as far as the IO ERROR!

Inspection of the text area after such an error shows that the first two bytes have been set to nulls, resulting in OK, if you type in LIST. Observe the 14 bytes, and a program listing will appear! The end of the program may have a "janky" look to it (although I have had no problems) as, of course, the Basic interpreter is relying on finding a null byte to terminate an instruction and there needs to be three null bytes together to determine the end of the program, so it will be interpreting anything that is sitting in RAM beyond the genuine program text (and may even display some "out of sequence" line numbers that you won't be able to access). Deleting text from the last genuine line number to end (DELNNN) will clean up the end of the program text.

The magical 14 bytes may be entered using Peter D'Arny's original contribution (July), Assemblers, Monitors, Topsy Turvy, Bruce Davies's December item or

direct POKEs — my word, such choice.

If the program is not in memory at the original time and it cannot be CLOADing for any reason, POKE is a byte by byte to a "safe" part of memory (around \$9900 will probably be fine) and EXORC to its start address. Mind you, as it is a CLOAD error that we are getting over, it won't matter about repeating the entire process from scratch anyway, having preloaded the recovery code which could then be the original Basic loader if necessary.

Resolving

CSAVEM the program. Before loading (and in fact setting it up depending on chosen method) do not forget to CLEAR to restore the machine code area. To run it, EXORC (with its start address if you have been using other machine code routines as you may have executed a different routine by mistake).

As the Basic program is stored without synchronisation gaps between blocks on the cassette, recovery beyond the IO ERROR will require more ingenuity. However, even to have stored the first part of a program may save a lot of heartache!

To recover machine code programs, machine code data files, the program data is read from cassette to memory starting

- Recover Basic program after NEW
- Recover Basic program after I/O ERR
- Pulls relocatable — place code where it is best for you
- ORG 1287^h will then directly precede Tapecon
- 1247 1E 01 L24 819 address of start of Basic text
- 1251 00 05 FD 128 402D reset address pointers in Basic text
- Reset Basic workspace address pointers
- 1254 24 02 L240 2,1 address null, 2 null bytes if end of program text
- 1256 1E 02 071 000 beginning of variable workspace
- 1258 1E 10 071 000 beginning of direct Pointer table storage
- 125A 1E 0F 071 00F end of storage in use in run-time table
- 1262 04 070 Exit from recovery program

The recovery program listing

Speaking in dialects

Keith and Stephen Brain review OS9 languages

IN ADDITION to the compiled Basic86 language, reviewed earlier in *Dragon User*, Dragon Data is also marketing two other language packages running under OS9 — Pascal V3.0 and C-Compiler (RT9.99 each). These offerings are rather unusual for such a small system but they extend the capabilities of the Dragon far beyond its humble origins and towards the far higher heights of much more powerful hardware and software concepts.

Pascal

Pascal is a language much loved by computer scientists because of its inherently logical structure, great power, and general "correctness" in their eyes. It was originally developed in the late 1950s by Professor Niklaus Wirth of Zurich, as a means of teaching programming as a logical and systematic discipline, and like all good languages now has a series of dialects. The dialect used here follows the ISO specification, rather than the UCSD model. Some of the more obvious original distinctions between Pascal and Basic have become rather blurred in some of the more recent and powerful versions of Basic (especially Basic86) as many of the best features of Pascal have been transplanted across.

A major difference to the programmer used to standard Microsoft Basic is that Pascal programs must be completely written in some form of text editor, and then compiled into an intermediate form, known as P-code, by a Pascal compiler before they can be run and tested. Whilst a comprehensive debugging package helps sort out the bugs which inevitably tend to fall into your programs, we first working with this type of batch-compiled language very tedious. I know that the "experts" will (perhaps quite rightly) say that this is because we are sloppy programmers, but in our experience it is often the original approach which seems to work best.

Pascal has found very wide application in serious computing because of its versatility and power, but, power almost inevitably implies size and there have therefore been difficulties in the past in trying to fit full-featured versions of Pascal into the tight confines of a microcomputer. However, as the 5809 microprocessor was specifically designed from square one to run such high level languages, life with the Dragon is more tolerable than usual. Programs compiled into P-code run rather slower than pure machine code, as each instruction must be processed in turn by the run-time

interpreter, but, the OS9 Pascal goes further than usual and allows you to also convert the P-code directly into "native" 6809 machine code. Taking this "back-door assembler" route gives a speed advantage of some four to 10 times over standard Pascal, without the necessity at all of actually grappling with mnemonics!

Another major factor in the attraction of this particular package is the ability of the OS9 operating system to support "virtual memory" on-disk. This means that you can actually run Pascal programs which are much bigger than the total memory size. A good example of the use of this feature is the Pascal Compiler itself, which operates in this way by swapping blocks into and out of memory. The language is supplied on two disks, both of which are needed to run the language, so a double disk drive is essential. "Pascal" is a machine code front-end which calls "Pascalc" (the swapping P-code interpreter) to run the P-code "Pascal-Compiler".

The text file "Pascallim" produces full English error messages at all stages. "Pascalc" is used to run compiled P-code programs, unless they are so large that the swapping method (and "Pascalc") must be used, which adds a time penalty. "Pascalc RUN" is the native code translation program, which is written mainly in P-code but also calls some machine code routines from "PascallT.MCBL", and uses the "PascallGeth" file which contains assembly language source code definitions. "Pascalc" is a linkage editor which is used to combine separately compiled procedures into a single program. Three machine-code support modules containing commonly used library routines are also included. "Support" takes up 9K, but two alternative stripped-down versions are also provided ("Support1" (1K) and "Support2" (8K)).

An extensive User Manual is included in the price, but if you are a newcomer to Pascal then you will also need a good introductory book — of which there are many (although *Programming in Pascal*, Revised Edition by F. Griesing (Addison-Wesley, 1980) and *Introduction to Pascal* — second edition by J. Walsh and J. Elder (Prentice-Hall, 1983) can be recommended). If you want to learn Pascal, or the language has obvious advantages in your particular applications, then this comprehensive package does all you could reasonably ask of it. For caretakers who prefer to use Basic86, which has many

Pascal-type features but a more user-friendly compiler interface.

C-Compiler is a rather more recent development than Pascal, having emerged from Bell Laboratories in 1972 as Dennis Ritchie's development of an earlier language named "B" (who said that computer scientists had no imagination!). The main feature which makes "C" stand out from other languages is that it was designed from the outset as a means of writing "portable" programs, in this context portability refers to the ability to run a program on different machines rather than any question of physical size, it falls somewhere between high-level languages like Basic and Pascal and Assembly Language, providing a variable structure which is closer to machine code but essentially processor-independent. The fundamental flow-control constructions (if, while, for, do and switch) are supported, but "C" deals essentially with characters, numbers and addresses. Inevitably it is not the easiest language to learn, and it does not feature all the error traps of higher-level languages, but you can't make omelettes without breaking eggs. The "Bible" of the "C" programmer is *The C Programming Language* by B. Kernighan and D. Ritchie (Prentice-Hall, 1978), although the price of £17.95 is rather steep and *Learning to Program in C* by Thomas Ploun (Prentice-Hall, 1983) is both cheaper (£13.95) and more readable.

Growth

A major demonstration of the power of the language is the fact that the Bell Unix operating system (on which OS9 itself is based) was entirely rewritten in "C" by Ritchie so that it could be routinely run on IBM, Honeywell and Interdata systems. "C" is rapidly growing in popularity amongst serious software writers as it makes them more productive. Once a "C" program is written it can easily be "ported" on to any machine which has a "C-Compiler" available, and in particular it is claimed that because of the close similarity between OS9 and Unix almost any application written in "C" can be directly transplanted, recompiled and correctly executed.

The OS9 C-Compiler again comes on two disks, together with a comprehensive manual. There is no official standard for "C" but the version follows the Kernighan and Ritchie model closely (but with some enhancements and extensions). In particular the ability of the 5809 to use a "direct page" structure is supported, and assembly language may be embedded. The system interface supports almost all the system calls of both OS9 and Unix and a complete standard library of predefined standard functions is included ("stdio.h").

The "cc" command calls a two pass compiler ("c.pass1" and "c.pass2") which converts source code into an executable file. An optimisation ("c.opt") pass automatically occurs after the compilation passes, which removes redundant code and searches for sequences that can be replaced by shorter and faster equivalents. A profiler option can be included which

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counts each time a function is called during execution, so that program structure can be logically modified if desired. The final output is position-independent relocatable 8086 code in standard OS9 memory module format. This code can be used as a subroutine called from the Basic88 RUN command, although care must be taken as internal data representation is not identical. If you are one of the stout hearts who can see into the future and wants to get to grips with "C", then here is your chance to get into the act as a target system price, and write software compatible with the next generation of machines.

The final utility disk currently available from Dragon Data is the *8086x Assembler Debugger* package which comes on a single disk, with a comprehensive manual, or 16KMS. The first part is a powerful macro text editor. Although the manual suggests that "it is commonly used to prepare letters and documents" we feel that you must be rather a masochist to use it in preference to a proper word processor such as *Stylegraph*. On the other hand it is extremely useful for preparing program source files for Pascal, "C" and the Assembler itself.

Operations

Multiple read/write files can be open simultaneously, all OS9 commands are available within the workspace, and the editor commands are a superset of those used in Basic88. Search and replace operations are supported, conditional tests can be applied and edit macros can be defined as new commands to perform particular specialised tasks. The Assembler was designed specifically for the modular multi-tasking environment of OS9 and therefore incorporates features for calling OS9, generating memory modules, encouraging the creation of position-independent code, and maintaining separate program and data sections. A free-structured symbol table organisation provides fast assembly speed and it has been optimised for use with the "Pascal" and "C" compilers.

In addition to producing "normal" OS9 modules the assembler can also produce "Motorola-compatible" code which is suitable for the standard Dragon, and conditional assembly is possible with IF, ELSE and ENOC. This disk (and the system disk) holds 40KPS files containing labels with their associated values which can be used directly for system calls thus saving the simpler and more logical whilst saving much time and or thumbing through the manual for codes. Error messages are printed out in the listing just below the source line containing the error. The *Interactive Debugger (IDBUG)* is the final part of this trio, providing calculations, memory examine and change, register display and change, breakpoint set and remove, memory clear and test, memory dump and memory select, and programs can be executed it a number of ways. Finally the Shell command allows system commands to be passed and other programs to be manipulated from within the

```

LDAD      Load module(s) from a file      FILEDAD
ASSEMBLER CALL  OS9 FILEDAD
MACHINE CODE  103F 01

INPUT: (X) = Address of pathlist (file name)
      (A) = Language/type (0 many language/type)

OUTPUT: (X) = Advanced past pathlist
      (Y) = Primary module entry point address
      (U) = Address of module header
      (A) = Language/type
      (B) = Attributes/revision level

ERROR OUTPUT: (CC) = C bit set
              (E) = Appropriate error code

```

Opens a file specified by the pathlist, reads one or more assembly modules from the file into memory, then closes the file. All modules loaded are added to the system module directory, and the first module read is LINKed. The parameters returned are the same as the LINK call and apply only to the first module loaded.

In order to be loaded, the file must have the "executable" permission and contain a module or modules that have a proper module header. The file will be loaded from the working execution directory unless a complete pathlist is given.

Possible errors: module directory full; memory full; plus errors that occur on OPEN, READ, CLOSE and LINK system calls.

An example of one of the Service Request Descriptions

debugger.

The basic starting OS9 package consists of the OS9 System Disk and a detailed OS9 Operating System User's Guide for OS9-85. A further even weightier tome, the OS9 Operating System - System Programmer's Manual, is also available from Dragon Data, but only in exchange for a further 50 per cent on the purchase price (£18.95), although that does include yet another of those video cassette cases! So what is the essential difference between a "user" and a "system programmer" and do you really need the information in the second volume? Perhaps the answer is already there, in some extent, as the very fact that the parts are sold separately indicates the non-necessity of the further information to many users.

The *System Programmer's Manual* is of a "general" nature, describing implementation of OS9 on any hardware, a factor which can sometimes cause confusion as it goes into details on ROM contents. It does, however, set out clearly the details of Basic System Organisation, Kernel Functions, Memory Utilisation, Multiprogramming, Process Creation, Execution Scheduling, Signals, and Interrupt Processing, before going on to the structure and definition of memory modules.

The Unified Input/Output system is described in detail with explanations of the operations of the File Managers, Device Driver and Descriptor Modules, Random Access File Manager, Disk Organisation, File Descriptors, Device Descriptors and Drivers, Sequential Character File Manager, Line Editing and so on. These details are mainly concerned with new implementations, although they are also essential reading if you want to add any "non-standard" devices to your Dragon. A brief mention of Assembly Language Programming Techniques is included, together with information on Adapting the Initialisation Module. A major (and probably the most important) part of the book is the lengthy series of Service Request Descriptions which define the service calls which are used to communicate between the OS9 operating system and assembly language programs. All these system calls have a mnemonic name beginning with "R" for system functions or "B" for input/output related requests, and they can be called by the "OS9" directive of the Assembler.

Undoubtedly this manual is essential if you are going to do any serious Assembly Language Programming, although its appeal to the average user is far more restricted.

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Dragon library

Mike Harrison reviews a selection of books for the Dragon

THE DRAGON 32 certainly comes out as one of the best intelligible micros, but its manual has been attacked for being one of the worst. The reader is assumed to already understand the main principles of computing and therefore it is really only useful to those who don't really need it.

The combination of the popularity of the machine, the paucity of the documentation and the versatility of the excellent 6809 chip, has led to a veritable explosion of books being published to fill the gap. With this article, 36 titles are listed, covering areas as diverse as a computer songbook

to lists of games, and from student's primers to assembly language programming. If you add to these the titles I've probably missed and the wealth of material published for the Tandy Colour Computer there is more than something for everyone. My thanks go to the Dragon Users Club for help in compiling this list — and if you know of any other useful books please let Dragon User know.

Apart from the restricted choice on the shelves in large stores, the main access to these books is through mail-order. So how do you know what to expect in any book

and are they all the same? I've taken a few off the list, read them thoroughly, typed in some of the listings and sifted out some of their gems which may be of interest to Dragon Users, both newcomers and old hands. I've tried to give some of the flavour of each book and to describe its contents so that you can judge for yourself if it might meet your needs. I'll begin with primers and then move on to look at the books for more advanced users — some will have to wait for future articles.

The introductory books assume no previous knowledge of Basic and help you into the world of computing through your Dragon. One such book, written specifically with children in mind, is Richard Wadman's *Dragon Magic*. It follows an effective path towards simple aims introducing children to the power of their machines and reinforcing their user handiness.

Readers are advised to work through the book slowly and make sure that they understand each section before moving on to the next. Children should ask a parent or teacher if there is something they don't understand, says Richard, or write to Dragon Data whose address is given.

Each chapter ends with a list of things to remember, summarising the teaching points so far. The author emphasises the importance of sequencing of events in his section on program order, flowcharts and loops, which is necessary to establish at an early stage the importance of planning.

Many educationalists are highly critical of the almost universal adoption of Basic (imaging *Beginner's All-purpose Symbolic Instruction Code*) as the computer language that children start on. They claim that the main reason it is chosen — that it is close to English and easy to learn — is also its major disadvantage. It is easy to write unstructured, ill-thought-out programs which actually work in Basic but when they take students into university and industry the discipline teaches their learning to program in the rigorous ways necessary.

It is therefore gratifying to note that Magic is stressing the planning stage early in the lives of our per-verse future scientists.

Amusing little cartoon illustrations pop up on each page or so to emphasise some-graphic point. "Keep wires tidy" and "do not poke around inside your computer or tv set" say the figures and later a number of sketches of shoe boxes are utilised to demonstrate the meaning of variables, one of the hardest concepts for young children to understand. String variables are hung on a washing line.

The book is very readable and its format of coaxing the reader a little at a time towards understanding by using ideas in the text, in illustrations, in small programs and finally as a "rule" reminds the best ways of learning.

Richard uses this method to take children to *if-then*, demonstrating *LINE* and *CIRCLE*. He ends the book with a glossary of the commands he has covered and with 16 small demonstration programs. These programs (average 15 lines each) all only take 10 minutes each to type in, yet point

Read all about it

Advanced Sound and Graphics for the Dragon 32	Kath and Steven Ryan	Sunshine	£5.95
Anatomy of the Dragon 32 About Room	Mike James	Wiley	£3.95
Books Guide to the Dragon 32	Jon Haydon	M & H Software	£7.95
The Color Computer Songbook	Ian Sinclair	Granada	£2.95
The Dragon Companion	H Clark	Arnold	£6.45
Dragon Encyclopedia	Mike James		£4.95
Dragon Machine Code for the Absolute Beginner	John Vander Pijpdon	F & H Comp Services	£4.95
Dragon Magic	Richard Wadman	Melbourne House	£6.95
The Dragon Programmer	Howard Friedman	Fontana	£4.95
The Dragon 32 Book of Games	Sid Lee	Computer Bookshop	£5.95
	James, Gail, Ewart	Granada	£3.95
The Dragon 32 And How To Make The Most Of It	Ian Sinclair	Granada	£5.95
Dragon 32 Machine Code For Beginners	Mike James	Computer	£3.95
Dragon 32 Games Master	Kath and Steven Ryan	Sunshine	£2.95
Dragon 32 Programmers Reference Book	John Vander Pijpdon	Melbourne House	£6.95
The Dragon Primer	Brian Lloyd	Sunshine	£3.95
Dynamic Games for the Dragon 32	Young, Keith and Birmingham	Publications	£4.95
Easy Programming for the Dragon 32	Stewart and James Carter	Wiley	£3.95
Enter the Dragon	Stewart and James Carter	Melbourne House	£5.95
Further Programming for the Dragon 32	Stewart and James Carter	Wiley	£3.95
Getting The Most From Your Dragon 32	David Barnard	Penguin	£4.95
Introducing Dragon Machine Code inside the Dragon	Ian Sinclair	Granada	£7.95
	Sinclair and Sommerville	Addison Wesley	£1.95
The Language of the Dragon	Mike James	Wiley	£9.95
Learning To Use The Dragon 32	George Knight	Gower	£4.95
Lost And Not With Your Dragon	Phelps and Tombs	Phelps Associates	£5.95
Making The Most Of Your Dragon 32	Gill-Gifford	Impress	
		Publications	£5.95
The MC6809 Cookbook	Carl D. Warner	MA	£6.95
Programming the 6809	Zaks and Laskov	Style	£12.95
Programming the Dragon 32	Peter Lafferty	Newton Technical Books	£6.95
		Books	£6.95
The Power of the Dragon	Shapiro and Butler	Macmillan	£6.95
36 Programs for the Dragon 32	Dr Tim Harner	Sutton	£4.95
6809 Assembly Language Programming		Owlson-McDowd	
60 Programs for the Dragon 32	Lawenthal	Hil	£10.95
Software for the Dragon 32	Bruton and Whaley	Pen	£5.95
The Working Dragon 32	Baill of Pennington	Computer World	£5.95
	David Lawrence	Sunshine	£5.95

to each of the areas already explained.

The book is suitable for primary school children (although not for those who have difficulty with reading) and has a clear text. My criticism of this book is its cost: £4.95 for 58 pages of large print and illustrations seems exorbitant when compared for example to *Inside the Dragon* which has probably 20 times the text for an extra £3.

Learning to use the *Dragon 32* by George Knight is also aimed at young *Dragon* users. The book is jargon-free and explains simply, for the most part, what you need to do. However, using a full half-page photograph to show a cassette tape and including photographs of a cassette player, two of the *Dragon* itself and one of a Commodore printer (attributed to an Apple II) contributes little to the knowledge of potential buyers.

The next chapter is as bad. This includes large photographs of the screen when the micro is first switched on; when a **CLOAD** command is being entered; whilst the micro is searching; and finally when it gives the OK after loading. I doubt if any of this would be of interest to readers of this magazine and young children would learn far more by being left alone on the keyboard than by ploughing through such a text.

The author then jumps to a mind-blowing explanation of the execution of a program. The task involves printing **THL**, **DO3** and **SHO3** in different combinations on the screen. To explain this he produces a 23-entry diagram showing memory contents at intermediate stages of computation. He moves on to string manipulation and to describe some peripheral devices and their use. He unnecessarily instructs readers to **OPEN "O", x=2** whenever using the printer and the un-plain English award of the year must go to: "For example **CHRG14C = 112** produces character 14C except that the green one (shown here as black) is orange".

Wasted space

George states that explaining physics is too complicated to cover in his book, so presumably is high resolution graphics rather only gets two pages and the **TBMP** feature which he claims does not exist.

If you compare this to the *Boots* guide, which is also £2 cheaper, it is shown up for the waste of space it is.

The *Boots Guide to the Dragon 32* is a really useful handbook and primer in one. "The hardware of computing", says Ian Sinclair, "consists of all those bits that you can drop and spill coffee over". The first picture is of a cut-away mains plug to help you with your wiring (check yours now) and immediately helpful suggestions abound. How about a 2-to-1 is adaptor so that you don't have to continually pull out and re-plug joints — these are sold as a *Panda Pack* in DIY shops. What about a four-way socket strip — you'll need all four eventually.

There's even some suggestions on likely hiding places for tuning panels on older-style televisions, some tips on types of tape to use and a reminder to the uninitiated to wind on the plastic leader

tape (just a hint). He gives a checklist for playback/recording faults, starting with a four-line program consisting of **R&Ms** rather than a game if it takes you hours to type in.

The author points early on to **PRINT TAB(0)** and multiple **TAB** statements along with a useful function for sending strings to tabs: **PRINT TAB(0);L&H(D3);2); X3** where **X3** is the previously defined string you wish to centre. This he frames by using conglomeration of strings so that the novice can immediately create pleasing effects on the screen early in his programming career.

This was one of the only introductory books I have come across which explicitly points out the equivalence of **x=** with **x++** in *Dragon Basic*. Some more are very particular about this and a solid confidence to the novice programmer not to leave this stone unturned.

The book quite deliberately sets out early on to declare the importance of "thoughts" in inputting responses. This is a bit strange of me, for I believe that any program which coaches because you make an inappropriate reply is no good to read or learn. To establish this principle early is good for technical reasons therefore, but it is also of use because it encourages program writers to remember that they write for an audience. That audience might read in any way to their programs, for we are not all the same.

The philosophy behind this handy guide is that you will develop from a program user to a program modifier to a programmer. The author has thus built in a structure to achieve this.

His first moves towards writing programs is to establish first the principles of program design. This, he states, starts with the machine switched off and preferably in another room. He presented sequence is where written aims lead to basic foundations: "Design needs planning and you can't plan properly with the temptation of a keyboard in front of you".

Ever practical, Ian invites the reader to keep one copy of his own programs with all the **R&M** statements intact and store this away somewhere. The "working program" is the version you use with all unnecessary lines stripped out for speed. If you get into difficulties you can then refer to your full copy to search for relevant routines. He

gives a useful tip too, in that if you want to test out each stage as you encode it (and who doesn't) a simple **Line 1 GOTO 120** will save you constantly reviewing your text and instructions each time you **Run** it. This will be removed at the end too.

Have you ever spent time looking up the numbers for those **PRINT** or **graphics**? Look no further, the *Boots* guide gives you a simple formula to work out the ones you want. Moving on to three graphics (**LINE**, **PRINT**, **BOX** & **FILL**) are cleverly introduced without getting lost in cumbersome rules. Sinclair is obviously impressed with the machine: "The graphics capabilities of the *Dragon* are spectacular . . . most other machines could only do these actions with a lot of very complicated programming". By way of illustration he gives a 14 line program to demonstrate the rotation and scaling of a shape on the screen.

Animation

In his description of animation using the useful **GET** & **PUT**, Ian uses Martin Layley's method for working out the dimensions for the array. This is one area where the *Dragon* manual was seriously wrong as I reproduce the method here to prevent you from wasting the memory space you were not to believe you needed.

- (1) Find the difference between the 'X' numbers of the **GET** box, and then the 'Y' numbers.
 - (2) Multiply these differences together and divide by 5, round up if there is a fraction.
 - (3) Now divide this answer by:
(a) 8 in **PMODE 3** or 4
(b) 16 in **PMODE 1** or 2
(c) 32 in **PMODE 0**.
- Round up again if the answer is a fraction.
- (4) Now use a two dimensional array **DM23(A)** where **A** is the final figure from step 3.
 - (5) If you get an error message, increase **A** by 1.

We use this method to animate his listing "liquids" in which along with a data processing program he gives at the end of the book for you to use along with what you have learnt. At £2.95 this book published by Granada takes some beating as a value for money introductory guide and I thoroughly recommend it.

Penguin books also publish an "impossible guide to your home computer", written by David Barnsley. Getting the most from your *Dragon 32* is widely available from the larger stores. It too has a section on connecting up the hardware and emphasises the planning process of programming. The author's approach is to get you to break down simple tasks like making a pot of tea or filling a fountain pen into their constituent parts. This idea is then utilised when problems are set asking you to write programs involving the calculation of compound interest and working out the possibility of two people at a party having the same birthday date. This is a most city approach. It's amusing as if the author is afraid that enjoying computing — drawing circles and painting them, or printing dubious messages on screen



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4 — Takes away its importance.

This chapter also gives some guidance on saving programs on cassette. Now the tip I was given when I started was to record only one program on each side of a tape (for speed of access to any particular program) and to record each program three times. CIDs are relatively cheap and abundant so for 50p you will have a sure-fire recording of any program. The other thing no book seems to tell you is that if you type in a program and then type **CLOAD** by mistake or search for your **C54-RID** program and cannot find it, it is not lost.



The **RESET** button will restore your control over the keyboard and the memory will be unaffected. You can then **LIST** and **CSAVE** your program. David's section doesn't contain this help.

Generally, the book's illustrations are more helpful than the colour photographs which feature the Dragon itself (in case you've forgotten what it looks like) and various sample screen displays.

For the novice to be faced with chapter 3 "How the computer works inside" is quite oddities. This contains such gems as: "There is a conditional jump instruction, saying: 'Jump to the address indicated if the accumulator is zero' . . ." and goes on to describe the instruction register, fetch cycles, "and-gates" and "or-gates". All this before mentioning variables, loops and data. If ever there was a case for believing that a book had lost its sense of direction, this is it. He later restores the position by including some hints on debugging and a run-down on editing lines.

Another example where the author's knowledge is a hindrance to easy explanation comes in "practice makes perfect", a chapter to help you write programs. He shows readers the way to get random numbers to 100.

```
LET X = INT(RND*(100+1))
Computer non-experts like us use
X = RND(100)
```

Other chapters give listings for a perpetual calendar, a dice game, prime factors and a

number sorting routine.

The book goes on to tell readers of the three ways to get sound from your Dragon: playing via your cassette recorder with **AUDIO ON**; **MOTOR ON**; **SOUND X**, **Y** and the **PLAY** command. If you've never used this by this little routine to make the Dragon roar:

```
10 INPUT A$
20 PLAY A$
30 GOTO 10
```

Be careful what you put in. The combinations of just the letters **A** to **G** at first.

Penguin's book gives some guidance on computer attachments with ideas on what to look for in joysticks and on choosing a printer. The author's parting shot is to tell his audience where they might get software (bought such because of the ease with which the instructions can be changed): "The cheapest of all . . . involves more work and a lot of typing. Magazines . . . contain programs written by users. They are often ingenious and many are better than those commercially available".

Disappointing

It is worth looking at them, he says, just to see how other Dragon owners have coped with certain problems, or got round some of the limitations of the machine. Well, Dragon User readers scarcely need to be told that—in fact that's my opinion of the book as a whole. More can be got out of a couple of editions of this magazine and a lot of experimenting than from this, very disappointing book.

A much better proposition for the same price is Brian Lloyd's *Dragon Trainer* which describes itself as a handbook for beginners. Here a disclaimer is needed. *Trainer* and some other books I look at later, comes from Sunbeam — which also publishes this magazine. My only connection with the company is as a freelance writer. I hope that the reservations I raise about their books here will convince readers of my independence, and reassure them that any praise is merited.

Trainer was written assuming that its readers would have little or no knowledge of computer programming and sets out deliberately to rectify this. The author claims to have tried out each section on complete novices and re-written where necessary in the light of this experience. It certainly gives the feeling of a friendly helper looking over your shoulder and it's difficult to fault its clarity. It is not, however, a book to be dipped into. It is read, however, stage by stage, and in this way the book will take you through the commands and when you need them so that you can get down to writing your own programs as soon as possible.

Getting started *Trainer* style does not consist of 11 different ways of approaching the on/off switch as we have seen earlier but introduces you to the quips of the keyboard and instant video. The **PRINT** commands and the idea of line numbers are put together with a simple definition: "A variable is a value which can be changed" demonstrated by a simple ques-

tionnaire program.

Brian's commitment to confidence building is admirable. Not only does he omit the unnecessary **LET X =** command as beloved of those who want to impress with the idea of computer mystique (I know something you don't know) but specifically says: "All variables have a value of zero before you use them. It is perfectly alright to refer to a variable which has not yet been given a value".

The author wastes no time in getting down to teaching the powerful **IF THEN** statement which he also uses to introduce inequalities, a concept very difficult to grasp for those whose schooling 10 years ago or more taught them that equality ($13 + 4 = 37 + 3$) was all that mattered.

He also rightly makes plain that the opposite is $N+10$ is **NOT** a point which needs making to novice programmers. This also serves to remind us of the slave nature of the microcomputer. It cannot guess that you mean it to distinguish between values of **N** less than 10 and those not satisfying this criterion. It only obeys orders. Make sure those orders are right.



The author shows the space saving value of text by getting readers to type in seven lines like this:

```
10 CLS$
20 INPUT "WHICH MULTIPLICATION
   TABLE WOULD YOU LIKE?"; N
30 FOR M = 1 TO 10
40 PRINT M; "x"; M; "="; M*M
50 NEXT M
60 FOR Z = 1 TO 4000: NEXT Z
70 RUN
```

I never understand why so many programs use ***** to denote multiply in times tables. The symbol is, of course, necessary in Basic for the operation to be carried out, but in printing form **X** or its video inverse is much clearer.

The book makes a couple of important points which need to be known before incorporating branching commands into your programs.

(1) Any commands after **GOTO** com-

- moved on the same line will not be carried out.

(2) The line numbers after GOTO or GOSUB cannot be replaced with a variable.

Unfortunately, it does not go on to say that we can get around this latter restriction for the most part with an ... GOTO. This command is, however, dealt with later in the book.

By comparison with the rest of the book the section on tape loading and saving is poor and there is even a mistake in the list of latter commands ('C' in fact) (deletes the rest of the line from the current cursor position). Apart from these lapses the book deals well with each Basic word, giving sufficient detail for you to use it with confidence. Every now and then a few are put together to make up a useful routine. PRINTAB, DEL, AND and REM are all covered. This latter I use periodically when program writing to check that my subroutines all connect and to send my helpful 40 error messages if not.

The author reminds us that an accidental break can be corrected by typing CONT and that TRON and THOFF are useful tools in error trapping. Unfortunately these last two commands cause the VDU chip to be dedicated to the text screen only, so I find are of little use in debugging graphics programs.

Brain is confidence-building again when he shows a simple mapplot to cater for answers from 'y/n' to 'y/n/y' for 'yes' which need otherwise cause errors:
IF B LEFTAR, 10 = "Y" THEN RUN
I would also include OR "Y" to be really terse.

Repetitive

As you progress through the book and build up a repertoire of Basic, so the lists of programs you are given become more complex. "Breakout", for example, concludes the chapter on graphics and "Artist" (the one on PEEK and POKE). This latter allows you to design a shape on the text screen by altering the memory contents in the screen memory addresses from 1024 onwards.

The musical potential of the Dragon has a chapter devoted to it. Try typing in this:

```
POKE150, 0 + SIN(0) - 80 + 30 +
LFO(0)
GO - 80 + SIN(0) - 80 + 30 -
13A
```

As you will see and hear, to get more subtle sounds you need more knowledge. The play implications of 0, -, + and so on are fully discussed.

The philosophy of building confidence appears again in the chapter on hi-resolution graphics. Each of the commands is used and described well. The statement: "The COLOR command is followed by the number of the colour you want to draw in, and the background colour you want" is clear and concise and will stick in the mind. Unfortunately this is followed by "if you wanted to draw in red with a green background you would use the command COL(0,1)" (oops!).

Trainer gives a neat program to introduce you to POKEing and POKEing series of formulas to GET and PUT with a one-dimensional array. The book ends by showing you that the 256 of user memory can be increased by 4.5K by typing POKE400 and extended to 30K by POKEing the value 5 into locations 26, 27, 28 and 31.

Appendices include listings of "Drawing on the hi-res screen", "Alarm Clock", and "Valley of Death". The latter is a huge graphical adventure game which takes 14 pages to list. For £5.95 I believe Dragon Trainer to be the best of its bunch of trainers for those who want an introduction to the Dragon.

If you've owned a Dragon for some time now, or learned the fundamentals on some other machine, you might well be looking for help in putting together programs more effectively. Two books designed to fulfil this need are *The Working Dragon 32* by David Lennison and *Dragon 32* programmer's reference guide written by John Gordon Paydon.

The first of these describes itself as a library of practical subroutines and programs. The author presents a collection of programming modules in each stage (art, storing and searching, managing money, drawing, education and that elusive high-resolution text — each has a chapter devoted to it as an example of modular programming. David explains his subroutines within the context of each major program but also with regard to its general application. He points out that when you are writing a number of programs, it is useful to build yourself a library of general-purpose subroutines and select and add to them for individual needs. A useful tip emerges even from his first processed module. This is to have a set line in every program which saves the current version as far as you have developed it. For example:

```
1 GOTO 3
2 SAVE "UNFILE" SOUND 1, 1 STOP
3 RUN
```

Thus if you keep a spare tape in your

the dragon trainer

software for beginners

brion-lloyd



rejoinder you can type GOTO4 every now and then putting your head-worked-for plate safely tied away in case of accidental freeze-ups or power failure. He points out that you are far more likely to do this frequently if a simple command is all that is required and will save an awful lot of frustration (don't we all know it) of seeing hours of work lost in a moment.

After reading this I now incorporate it in my test programs but with the addition of POKE 400000 I've been caught by that one too. The modules presented in each section have a first-class commentary. A testing routine is given in each case to make sure that errors can be trapped before they interfere with other parts of the program.

Test the trainer

The programs themselves vary in their usefulness. The modular education ones amount to little more than question and answer sessions. In one case this involves the latter drawing items on the screen which the student has to name. This is supposed to teach young children to read. Apart from the fact that it seems to me to be more of a test for the tester to get his shape recognised than the child — it is of course a test of spelling, penocoding not decoding. It also tests across current practice to use the power of computers only for those tests not better done in other ways — ever heard of Flashcards?

The program "Where" involves the latter drawing a map on the screen and the child has to name the city indicated. Presumably divine inspiration supplies the appropriate names.

A much more useful chapter follows, offering solutions to the Dragon's basic flaw, its lack of hi-res text. "Character" allows you to build up any character capable of being fitted into an area of 20 x 30 picture elements (known as pixels). Once designed these characters are stored on tape for subsequent use in other programs. The author claims that in this way the Dragon's capabilities can be substantially extended. The advantage of this method over the usual DRAWing, he claims, is that there is no need to go through the painfully slow process of building up the fairly complex strings that will be drawn and writing them into each new program. The given modules help you design your characters by means of an on-screen grid and point movement within the grid, namely rotation and inversion.

Having saved your characters on tape a new program "Dictionary" is built up, again from a series of modules. This collects the data and puts your shapes into memory from where they can be called as you want them. This method is not, of course, restricted to test characters but could be developed for, say, sets of symbols for electronic diagrams, arcade games shapes, chess pieces or the Russian alphabet. The screen dump mixing graphics and text (this one was created using Paul Bernard's Picture Writer), may give you some ideas as to the usefulness of such a facility and the characters you might design.

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Useful as David's programs are, I think their benefits over DRUMWing may be overstated. All this C&A'ing and GLO'ing is tempting Providence (the I/O fairy is not always kind), and has he never heard of merging programs? The truth lies somewhere in between. If you want a collection of a large number of non-alphabetic symbols then "Character" and "Dictionary" are probably your best tools. If you just

like most reference books, your ability to apply the information depends on your knowledge of the subject. In this case if you are a novice Dragon programmer the facts and figures in the book will not be of as much use to you as to those with greater knowledge and experience.

The book begins with a complete Basic dictionary of statements and functions, a detailed description of each word and examples on how to use it. It even gives the average time taken to execute. For example:

Motor

- Turn the cassette motor on or off
- MOTOR ON
- MOTOR OFF
- Allows the motor of the cassette to be controlled by a program for creating special effects (see AUDIO)
- MOTOR ON 0.0072 secs
- MOTOR OFF 0.0008 secs

There are also some interesting details on decimal, hexadecimal and octal numbers and an error in the Basic. Try this:

```
10 X = 53.74 : Y = 51 + 2.74
20 PRINT X*Y
30 IF X = Y PRINT "RIGHT" ELSE
PRINT "WRONG"
```

For several numbers the above equation will give "RIGHT" or "WRONG". For example, I found that for $X = 70.08$ and $Y = 1.1 = 0.9 + 0.08$ the equality was accepted.

Strings

There seems no set pattern as to how the decimal representation is affected in floating point addition. Having identified the problem, the author gives us the solution. Converting the numbers into their string equivalents using STR\$, Basic then recognises their equality.

Chapter 2 deals with graphics starting with a discussion on the quality of the picture resolution. Five semi-graphic modes and eight true graphic modes are detailed and possible applications given. For instance:

Semi-graphic: 8-24 — for higher resolution in the vertical axis; could be good for accurate bar charts but can be wasteful in terms of memory.

As only five of these modes can be reached through Basic, he gives the POKes needed to select each of the others. When memory locations between 65472 and 65477 have been set the problem becomes how to take commands such as LPRINT, GRAPH and PABIT. Here you'll find out even though the author doesn't give some tips.

In "Sound", John devotes some space to the PLAY command and gives listings for you to play "God Save the Queen" and "In An English Country Garden". He then, more interestingly, goes on to assembly language giving a routine for setting up the PUA register for the production of sound. There is a distinct advantage in using machine code in this area. When using sound in a Basic games program you have to keep the noises short as the processor is tied up in producing the sound and the program has to wait until it has finished.

In machine language programs, howev-

er, you can do some processing in between the toggling of the speaker and so longer notes can be played without disturbing the flow of the game. Thus you should be able to reproduce "Becky" with your Tonite and Dean skating game for the Great game as takes your fancy.

A fascinating machine language routine within a Basic program is given which will teach your Dragon to speak. When run the menu gives a variety of choices allowing you to digitally encode a few seconds of speech and then analyse it graphically or save the data on tape. Your voice (or music) is entered via the cassette system, either previously recorded or direct. You can check on the quality of the coding before you save to tape by reproducing the sounds presently held in memory. In my case the reproduction wasn't very good (about the same as "Andrew Macdon"). This might be because my microphone/cassette system wasn't up to the job, the volume controls were not set right or maybe the method is not up to much anyway. It nonetheless gave hours of fun to the family (ever tried to get a cat to "meow" on cue?). It was well worth the 40 minutes it took to type in. Mind you, this wasn't the first time we had tried to enter that program.



The worst feature of these machine code within Basic programs is that DATA errors are not easily spotted and can lead to disastrous results. These latter books are full of them and so none are the magazines, so if you go for one of these, here is the scope of experience with a few tips to avoid calamity. Firstly double check the data, especially the hexadecimal addresses. Secondly save a copy before running it — then at least you will have an albeit imperfect copy safe on tape should the computer freeze or play up because of a careless POKe. Lastly, count the pieces of data and do a little dummy run on your program like this:

```
1 READ Z:X = 3*Y
2 IF Z = 999 THEN PRINT X = I:
  PRINTS OF DATA: /STOP
3 GOTO 1
```



want to write on it, yes, then use the strings which have already been worked out for you (often found in magazines). You only need type them out once, save this program on tape with the routine at 10,000 and then by the use of GCL, RUNM, PEEN and POKe you will be able to put them into any program.

The author puts his techniques from other chapters to use in a variety of utilities loosely titled "Hasty Programs". He lists a database "Name and Number" routine to hold facts about certain value of level-stuffs or costs at time in stock. His program "Typed" consists of a number of modules which together aim to turn you into a touch typist and further routines are suggested to involve words per minute and other refinements.

Subroutines in "Texted", a simple word processor program, may be of use to those who own, or hope to own, a printer. "Texted" has a screen editing facility. "Music" helps you compose tunes of your own and allows you to save data on tape to use in programs of your own. "Dragon" is a graph-drawing tool. You can draw line graphs of a variety of data, specifying the units and the set-up of the axes. It utilizes text generated by "Character", discussed earlier.

These substantial programs, like the rest of the book, are well commented on, and the subroutines can form the basis of a library to be incorporated into almost any program you care to write. If any it has described strikes a chord, then perhaps The Working Dragon 32 is the book for you.

The Dragon 32 programmers' reference guide goes for the same ground in that it aims to make you better, rather than get you started. It is organized as a reference source for both Basic and experienced 6502 machine language programmers.

410000 DATA 899

Program writers could help a day too by incorporating a data check in the top:

```
1 READ 2:IF 2 = 999 THEN GOTO 5
2 X = X + 2: GOTO 1
5 IF X = 28943 (or whatever is the
correct value of the sum of the data)
THEN GOTO 10
6 PRINT "DATA ERROR": STOP
10 REM -- START OF PROGRAM
PROPER
```

Now that we have the facility to reproduce the human speech thanks to the Reference Guide what can we do with it? In the first instance it will almost certainly not be clear enough to hold the instructions for a game. It won't be long enough either, for the stored speech takes up to 6K of memory and will last about one to four seconds depending on content. You could use it, however, to give short, often repeated commands like "Fire" or "Go" at the start of a new game, or "Good", "Well done" and so on in a test. The book gives the exact instructions as to saving machine code and data to call from within your own programs.

Chapter 4 gives a gentle introduction to machine code — enough to get you interested but not enough to get you programming. There is listed for you a machine code monitor with which you can enter, modify and display parts of memory, as well as find a string of characters within the memory. It will evaluate an assembly language program and convert numbers from hexadecimal to decimal and vice-

versa. Later in this chapter the author provides a summary of handy ROM routines which can easily be used in machine code language programs.

This excellent book ends with a superb final chapter on handy tips and routines. After a discussion on the machine implications on speeding things up a variety of short subroutines are given. To disable the "break" key, for example, John Pockley locations 411 to 415 with the values 228, 203, 4, 227 and 228. The break key is then turned off by POKING 410 with 255 and on with 67. Unfortunately this must be used directly from the keyboard but he does let a Basic program to create a machine code file which you can call up from within programs of your own and turn the break key off and on at will. Other paragraphs show how to use screenset in semi-graphic modes, create an auto-key repeat, allow the Dragon to read two keys at once and recover any program after a

MEM command.

Apparently MEM does not wipe out a program, I just modified the Basic pointers so that the program cannot be executed. John's program will create a machine code file which you can reload into your micro should you ever inadvertently have overwritten your latest masterpiece. He even gives the POKing which you could use directly from the keyboard should you not yet have made the machine code file but need its assistance.

Two other sections deal with redrawing Basic keyboards and their actions. I've always favoured a machine which started up on "J000" to keep up with the latest fashion. I can do it now. The book also gives a merge routine and some suggestions as to its usefulness. Some graphics tests are made. Page wrapping to demonstrate animation is very effective and a series program shows the power and versatility of this command.

The Programmer's reference guide at £5.95 seems much the better to me of these two "second level" books. Its routines seem more general and tips more pertinent to the sort of programs I am likely to write. You do not need to know about machine code to use some fast and useful files. John understands too that these tools are only liable to be of any use in your own programs, so he explicitly tells you how to arrange files.

That's it for this month — more in subsequent issues looking at the books that will further expand your programming capabilities. ■



Simple program from the Reference guide

SPRITES FOR THE DRAGON

Merlin's Sprite Magic offers a whole host of new features for the Dragon

Up to 128 sprites. Size up to 40 x 40 in mode 4, even larger in other modes. Sprite Magic uses the 256 x 192 grid for screen addressing. Sprites are programmable for joystick control and/or keyboard control. Sprites may be defined as missiles fired from other sprites in response to the button or keyboard. Sprites may be programmed to bounce (like a bouncing ball), or wrap round, or disappear automatically when they get to the edge of the user defined screen. A wide range of commands and functions offers comprehensive control of speed, direction, screen edge behaviour and collision detection.

Animation is easily implemented with DRWG function which swaps the drawings being used for sprites and they needn't even be the same size.

Sprites of the commands are exceptionally powerful. . . . MOVIN moves a single sprite, MOVEM moves a block of sprites, MOVEM moves all the sprites. All the MOV commands observe the individual direction, screen wrap, joystick and keyboard instructions for the various sprites. The REPORT function reports how many have crashed. The HIT function reports crashed sprite numbers.

Sprites are non-destructive i.e. they do not leave a "tail". They're fast and they're efficient and they're easy to use.

The Dragon now has its very own BEEP command. This one, however, offers a range of 16 pre-programmed guttural, explosions, sirens, laser sounds and the like. You can also program your own. . . BEEP (six parameters) lets you generate the kind of noises you have heard in other high quality software.

Keyboard handling has had some attention too. . . . optional auto-repeat, REPEY function returns ASCII code. KEY function does the same, but waits for a keypress. CLEAR key clears hi-res screen and forces the game cursor.

We have also included a couple of routines to provide text on the hi-res screen. . . . in all 5 PRCORS with enhanced cursor controls providing relative as well as absolute positioning. PAGE command, HOLD command (to be headers or graphics), COLCLR command changes text foreground and background colours etc. The hi-res screen is used just like the Basic text screen, including editing. You can also re-define the character set using the handy set command CHR(n) - eight bit values.

Sprite Magic requires absolutely no knowledge of machine code. The comprehensive manual describes the new Basic commands in full, with lots of examples. As well as the documented demonstration programs, the cassette includes Character and Sound Generators. Made in two (give you card), Shooting Gallery and Breakout. Price £17.25 all inclusive.



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Tic, tac, toe

Peter Helen Johnstone in Suffolk

This PROGRAM, which is more commonly known as "stone, paper, scissors", is a game for one player. The player chooses either "scissors", "stone" or "paper", and then waits for the Dragon to choose one randomly.

If stone and scissors are chosen, scissors wins as it blunts the scissors. If stone and paper are chosen, paper wins as it wraps up the stone; and if paper and scissors are chosen, scissors claims victory by cutting the paper.

A match is won by gaining three points, one point is achieved by winning one try. A

game is won by gaining three matches.

Program notes

Lines

50-180
173-222

230-290

300-320

330-360

370-400

410-450

Defines graphic strings.

Draws and plays the sequence.

Instructions.

Alters resolution according to type of television.

Initialise variables.

Draws count-down numbers.

etc.

Computer chooses item, checks for wrong inputs.

470-520

530-620

630-700

710-740

Draws out chosen items.

Checks for winner and prints Win.

Checks for game or match wins.

Checks for re-run.

Variables

TS,CS

HS=0,1

WS=0,1

CS=0,1

AS,BS

PS,DS

ES

YS

ZS

SD,DR

SP,PC

Title (T and G) graphics.

Countdown numbers.

Scissors graphics.

Paper graphics.

Stone graphics.

Draw graphics.

Win graphics.

PMODE variable

Dragon score.

Player score.

```
10 ' TIC TAC TOE      HELEN JOHNSTONE
    FEB '84
20 PONE=25495,0
30 CLEAR 300
40 PMODE4,1:SCREEN1,1:PCLS
50 CLS:TI="R30D4L13026L4U26L13U4"
60 C="R30D4L26D2R26D4L3U30"
70 HI="DH118,40:R20D30L204R16UPL1
    6U4R16UPL16U4"
80 W="DH118,40:D4R165PL16D17R20U4
    L16UPL16U17L20"
90 D="DH118,45:H126,40:R4D26R8D4L
    204R8U22:H118,49:U4"
100 AS="BMS0,50:D70H58,75H50,50L10
    D1SR10D10H40,118H70,54H70,58H72,70
    H4,66H70,54H50,74"
110 BS="BM200,50:D70:R208,75:H200,
    50:L10D18R10D10:H190,118:H220,54:H
    228,58:H222,70:H244,66:H220,54:H20
    0,74"
120 P="R70D70L80U60R10U10"
130 S="D15U10R10U5L10BR15D15U10R1
    0U10U5L10BR15D15U10R10U5L10BR15R1
    0L10BR10L10D10R10U5L10R10D10L0R7
    D10"
140 E="R120L8DWR0D17L12U4R0UPL0U
    17R114D4R4D26R4U26R4U4L13BR14R1D3
    0L12U30R4D4R4D22L4U22BU4R10D30R4
    U3AR4D26R4U30L12BR14D30R12U4LBU4R0
    U4LBU4R0U4L12"
```

continued on page 47

```
150 YH="BMS2,140D30R20U4L30R4BD4
    22R12U22L12BU4BR20D30R4U10R10D10R4
    U14L13U2R16U14L30R4BD4D4R12U4L12BU
    4BR20D30R4U10R12D10R4U30L20R4BD4R1
    2D10L12U10BU4BR20D30R20U30L4D26L4U
    26L4D26L4U26L4"
160 ZH="D30R20U30L4D26L4U26L4D26L4
    U26L4BR26D4R8D22L8D4R20U4LBU22R0U4
    L20BR26D30R4U26R12D26R4U30L30BR26D
    17R16UPL16D4R20U17L16UPL16UPL20"
170 DRAW"BM240,180:D4U2R2U2D4":DRA
    W"BM240,170:R0L30GL5"
180 DRAW"BM80,40"+TI:PLAY"TS001CCD
    DEFFBS0AABBD3CC"
190 DRAW"BM126,40:R4D30L4U30":DRA
    W"BM80,80"+TI:PLAY"DEFFBS0AABBD3CC"
200 DRAW"BM146,40"+C:DRAW"BM122,0
    0:R12D30L11L4D11L4U30R4BD4R4D4L4
    U":DRAW"BM80,120"+TI:PLAY"03DCDDE
    EFFBS0AABBD4CCD"
210 DRAW"BM146,80"+C:DRAW"BM122,1
    20:R12D30L13U30R4BD4R4D22L4U22":PL
    AY"04CCD03BBAAGGFEDDCC"
220 DRAW"BM146,130:R30D4L26D9R26D4
    L26D9R26D4L3U30":PLAY"03DCD2BBAAG
    GFEDDCCD10CBBAAGGFEDDCC"
230 PRINT80,"INSTRUCTIONS
    *****":PRINT:PR
    INT:PRINT"THE RULES ARE VERY SIMP
```

SOME HAVE IT



If you've reached the stage where the restraints of your 6809 based computer are becoming a bore, cast your eye over this advertisement.

After 4 years of research, in conjunction with T.S.C. Incorporated, Compuserve are launching "The Flex" in Britain.

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LE YOU HAVE TO CHOOSE ONE OF THE FOLLOWING WHEN THE NUMBER "1" COMES ON THE SCREEN.

```

11=SCISSORS
12=PAPER
240 PRINTB326,"13=STONE
PRESS A KEY TO CONTINUE"
250 ANS$=INKEY$:IF ANS$=""THEN 250
260 PRINTB330,"

```

THE DRAGON ALSO CHOOSES ONE. SCISSORS CAN CUT PAPER BUT NOT STONE. PAPER CAN WRAP STONE BUT IS CUT BY SCISSORS ETC. THE FIRST TO WIN 3 MATCHES WINS THE GAME. DRAGS DO NOT COUNT."

```

270 ANS$=INKEY$:IF ANS$=""THEN 270
280 PRINTB330,"

```

YOUR ITCH IS DISPLAYED ON THE RIGHT SIDE OF THE SCREEN, THE DRAGON'S ON THE LEFT."

```

290 ANS$=INKEY$:IF ANS$=""THEN 290
300 CLS:PRINT:PRINT:ARE YOU USING
A BLACK AND WHITE T.V.?"

```

```

310 ANS$=INKEY$:IF ANS$=""THEN 310
320 IF ANS$="Y" THEN U=4 ELSE U=3
330 CLS:PRINTB66,"WHO AM I GOING
TO PLAY WITH?":INPUT I$

```

```

340 PRINT:PRINT:HELLO "I$," ARE YOU
READY..... THEN LETS PLAY.
FOR I=1 TO 1000:NEXT I

```

```

350 DR=0:PE=0
360 RD=0:RP=0

```

```

370 PRODU,1:SCREEN1,0:PCLS
380 DRAW H$:SOUND190,5:PCLS
390 DRAW H$:SOUND180,5:PCLS
400 DRAW D$:SOUND170,10

```

```

410 Y=0:Z=0:B=0:F=0
420 C=RD+1:

```

```

430 DR=(INKEY$:IF DR=""THEN 430
440 A=VAL(DR):

```

```

450 IF A/3 OR A/1 THEN CLS:PRINTB
236,"WRONG KEYS..TRY AGAIN":SOUND
120,5:SOUND90,5:FOR I=1 TO 100:NEXT
I:GOTO350

```

```

460 PRODU,1:PCLS:COLOR 3,1:SCREEN
1,0

```

```

470 IF C=1 THEN DRAW A$
480 IF C=2 THEN DRAW "BM30,40"+P$+
"110,50"+"BM16,60"+B$

```

```

490 IF C=3 THEN DRAW "BM25,40:R45H
60,50D45H70,10SL45H5,95U45H25,40B1
58D50H30U10BL55H150D50H7,57"+B$

```

```

500 IF A=1 THEN DRAW "BM166,50"+B$
510 IF A=2 THEN DRAW "BM166,40"+P$
+"BM156,50"+"BM162,60"+B$

```

```

520 IF A=3 THEN DRAW "BM175,40R45H
230,50D45H220,10SL45H135,95U45H175
,40B158D50H30U10BL55H156D50H157,57
"+B$

```

```

530 IF C=4 THEN DRAW Y$:SOUND 96,1
0

```

```

540 IF C=1 AND A=3 THEN F=1:SOUND
1,1

```

```

550 IF C=1 AND A=2 THEN B=1
560 IF C=2 AND A=3 THEN B=1

```

```

570 IF C=2 AND A=1 THEN P=1
580 IF C=3 AND A=2 THEN P=1

```

```

590 IF C=3 AND A=1 THEN D=1
600 IF D=1 THEN DRAW "MS,150"+D$:S
OUND 120,5:SOUND90,5

```

```

610 IF P=1 THEN DRAW "RM150,150"+D$
:PLAY "TS000DEFFFGAAH803CC0EDFFG
GA8803CC"

```

```

620 FOR I=1 TO 1000:NEXT I:PCLS
630 RD=RD+D:RP=RP+P

```

```

640 IF RD>3 OR RP>3 THEN 650 ELSE
630

```

```

650 CLS:PRINT:PRINT:IF RD>RP THEN
PRINT "DRAGON WINS "I$RD:" MATCHES
TO "I$RP ELSE PRINT I$ WINS "I$RP
" MATCHES TO "I$RD

```

```

660 IF RD>RP THEN Y=1 ELSE Z=1
670 FOR I=1 TO 3000:NEXT I

```

```

680 DR=DR+Y:PE=PE+Z
690 IF DR>3 OR PE>3 THEN 700 ELSE
680

```

```

700 CLS:PRINT:IF DR>PE THEN PRINT"
DRAGON WINS THIS GAME

```

```

DR:"I$":PE ELSE PRINT"
YOU HAVE BEATEN THE DRAGON

```

```

PE:"I$":DR:FLAG="TS000G
CCEBEP0P8CCDEFG":FOR I=1 TO 4:PLAY
FLAG:NEXT I

```

```

710 PRINTB140,I$:PRINT"DO YOU WANT
TO PLAY AGAIN (Y/N)"

```

```

720 A$=INKEY$:IF A$=""THEN 730
730 IF A$="N" THEN 740 ELSE CLS:GO
TO330

```

```

740 CLS:FOR E=5494,0:END

```

Hunt the Dragon

From Roger Reading in the *West Midlands*
THIS PROGRAM is based on the children's game of hide and seek, when the player is given the hint "cold", "warm", or "hot", according to how close the player is to the hidden object.

The computer will take a "dragon", and

you have to find it by entering a letter and then a number to the computer's prompt.

The computer will indicate how close you are by showing your chosen square as blue (cold), orange (warm) or red (hot). This game has the added attraction of helping to teach co-ordinates in the con-

ventional x-axis, y-axis format.

Program notes

- | | |
|---------|--|
| Lines | Set up the initial screen. |
| 30-100 | Draws the grid. |
| 100-230 | Labels the axes. |
| 240-295 | Chooses a random square within the grid. |
| 300 | Accepts a letter and then a number input within the grid limits. |
| 330-405 | Converts input letter and |
| 410-425 | |

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4	number to a position on the PRINT or GOTO	the player's chosen square is to the computer's chosen square, and then prints the	player's chosen square is the appropriate colour. Win routine.
420-520	Checks to see how close	520-550	
<pre> 10 "DRAGON" 20 "R.K.READING 30 CLEAR 1000 40 CLS 50 PRINT @ 72,"hunt the dragon" 60 PRINT @ 128,STRING\$(32,"*") 70 PRINT @ 200,"THERE IS A DRAGON HIDING ON THE GRID. FIND HIM BY ENTERING A LETTER THEN A NUMBER R.THE COLOURS SHOW HOW HOT YOU ARE " 80 AB="03L2DL4LC2CC02L1B0" 90 PLAY "T5"+AB 100 PRINT @ 354,"PRESS ANY KEY TO PLAY" 110 B\$ = INKEY\$ 120 IF B\$="" THEN 110 130 CLS 140 FOR N = 139 TO 149 STEP 2 150 PRINT @ N,CHR\$(143+64);CHR\$(14 3+60) 160 FOR R = 2 TO 6 STEP 2 170 PRINT @ N+32*N,CHR\$(143+64);CH R\$(143+60) 180 NEXT R,N 190 FOR J = 171 TO 181 STEP 2 200 PRINT @ J,CHR\$(143+60);CHR\$(14 3+64) 210 FOR J = 2 TO 4 STEP 2 220 PRINT @ J+32+J,CHR\$(143+60);CH R\$(143+64) 230 NEXT J,J 240 FOR K = 65 TO 76 250 PRINT @ 298 + K,CHR\$(K) 260 NEXT K 270 FOR L = 1 TO 7 280 PRINT@ 340-32*L,L; 290 NEXT L 300 X = (RND(10)+(139)+(RND(5)+32) 310 RESTORE 320 PRINT @ 448," " 330 PRINT @ 420,"WHICH LETTER DO Y OU WANT?" 340 INPUT AB 350 IF AB > "L" THEN 320 360 PRINT@420," " 370 PRINT@420,"WHICH NUMBER DO YOU WANT?" 380 INPUT B 390 IF B < 1 OR B > 7 THEN 360 400 PRINT @ 420," " 410 Z = ASC(AB)+266 420 Y=Z-(32+(B-1)) 430 IF Y = X THEN CLS:PRINT @ 234, "BOT HIM";GOSUB 530;GOTO 140 440 FOR R = 1 TO 6 450 READ A;IF Y=B+R THEN PRINT @ Y ,CHR\$(143+68);;GOTO 310 460 NEXT R 470 DATA -33,-32,-31,-1,1,31,32,33 480 FOR S = 1 TO 14 490 READ C;IF Y = B+C THEN PRINT @ Y,CHR\$(143+112);;GOTO 310 500 NEXT S 510 DATA 66,65,64,63,62,54,30,2,-2 ,-30,-34,-62,-63,-64,-65,-66 520 PRINT @ Y,CHR\$(143 + 32);;GOTO 310 530 B\$="03L2CBL1EBCC02WBFD0CC0C" "40 PLAY "T15"+B\$ "TURN </pre>			

Maths

From Stanley White in South Yorkshire
AFTER SEEING the Maths program in the
November issue of Dragon User, I decided
to develop my own little table program.

Program notes

Lines	1000-1080	right or wrong.
90-410	2000-2120	Clears wrong answers.
500-610		Initials, draws screen and asks
1000-1080		if another game required.
1100-1140	2500-2600	Allows digit inputs and
1150-1190		draws on screen.
1200-1510	3000-3810	Draws letters onto screen.
	4000-4010	Draws numbers onto
	5000-5250	screen.
		Instructions.

```

1 GOTO3
2 POKE5494,0:MOTOR ON:AUDIO ON:FO
R D=1705000:NEXT C:SAVE"X-TABLES":S
OUND1,1:MOTOR OFF:FOR D=1705000:NEX
T:MOTOR OFF:STOP
3 REM*****
4 REM*****
5 REM*****
10 PHIDE=C:COLOR0,1:CLS:POKE5495,
0
20 TIMER=0:GOSUB5000
30 REM"set up character array"

```

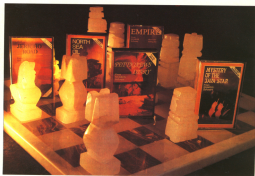
```

40 DIM A$(127):FOR T=0 TO 27:READ
A$(T):NEXT T
50 DIM M$(11):FOR T=0 TO 11:READ
M$(T):NEXT T
60 REM"11 letters"
70 DATA BUNR4D2L2C2BAC2
80 DATA BBA
90 DATA NRU4R4D3NL3D
100 DATA NRU4R4R3L3U2R1D2B2D2
110 DATA NRU4R4R3L3U2R1D2B2D2
120 DATA NRU4R4R3L3U2R1D2B2D2
130 DATA NRU4R4R3L3U2R1D2B2D2

```

continued
on page 53

MIND GAMES



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```

140 DATA RMULUCMR4UCR4BD4
150 DATA BRN3MULU4MR4BD2D2
160 DATA RMULUCMR3UCR4BD4
170 DATA BR2MUCR4MR4BR
180 DATA R2MUCR4M4L3BD4
190 DATA M4MUCR2MUCR2D2
200 DATA M4MR4MUCR3
210 DATA U4R2BD3R2BD4
220 DATA U4MR3M4L3D
230 DATA RMULU4R4D4M4L4
240 DATA RMUL4M4L3R4BD3D
250 DATA U4R4D3M4L3D4L4
260 DATA RMULU4R4D3L2P2
270 DATA R3MURUL4UCR4BD4
280 DATA BR3MUC3L4M4L2D2D4
290 DATA M4MR4MUCR3M4M
300 DATA U4R3D2D2R2MUCBD4
310 DATA M4R3M4M4R3M4L3
320 DATA MUCR4MUCR2MUCR2D2
330 DATA MUCR2D2R3MUCD2
340 DATA UCR4M3R3M4L4BD4M4L3
350 REM#number*anline#
360 DATA U4R3D4M4L3
370 DATA BRM4MR
380 DATA UCR3M4L3BD4M4L3
390 DATA R3M4L3M4L3BD4
400 DATA MUCR3MUCR3D3
410 DATA R3M4L3M4L3BD4
420 DATA MUCR3M4L3M4L3BD4
430 DATA M4R3D4
440 DATA U4R3D4M4L3D4M4L3
450 DATA R3M4L3D3R3BD3
460 DATA R3R3BD4
470 DATA U4MUCR3M4L3M4L3BD4
500 REM#end*anline#
510 DRAW"BM",0:BR4BD3D="N13(10)+*BR
3"+N13(10)+*BR3"+N13(10)+*BR5BD3U
6L21D3R4D2"
520 DIM B(12,12):GET(0,0)-(21,10),
B,B,PCL5
530 FOR X=0TO21:STEP2:FOR Y=0TO11
STEP10
540 PUT(X,Y)-B(X+2,Y+10),B,PSET
550 NEXT Y,X
560 FOR X=1TO34:STEP2:LINE(X,1)-X
+19,Y),PSET,BF:NEXT:***clear*stop
#boxes***
570 FOR Y=1TO11:STEP10:LINE(1,Y)-12
0,Y+0),PSET,BF:NEXT:***clear*sid
#boxes***
580 B=1:IT=0:REM#put*1-12*in*top#
boxes***
590 FOR X=YTO240:STEP2:
600 IF B=10 THEN X=X-3
610 DRAW"BM"+STR$(X)+",B":I4=STR$(
B):GOSUB4000
620 B=B+1:NEXT X
630 I4=Y+5:IT=0:REM#put*1-12*in*sid
le#boxes***
640 FOR Y=18TO118:STEP10
650 IF B=10 THEN X=X+5
660 DRAW"BM"+STR$(X)+", "+STR$(Y):I
4=STR$(Y):GOSUB4000
670 B=B+1:NEXT Y
1000 REM#draw*in*formation#boxes***
1010 LINE(10,123)-(252,190),PSET,B
1020 DRAW"BM48,130":A4="LEARN*YOUR
BTIMES*BTABLES":GOSUB3000
1030 DRAW"BM44,175":A4="YOU*ARE*CU
PTON*THE*DE*TRY":GOSUB3000
1040 DRAW"BM50,185":A4="PRESS*BDTO
END":GOSUB3000
1050 DRAW"BM10,145":A4="TRY*":GOSUB
3000
1060 DRAW"BM200,145":A4="SECTION":
GOSUB3000:DRAW"BM22,160"+N14(2)
1070 REM#clear*arrays***
1080 SCREEN1,1:DIM C(12,12):FOR X=
2TO12:FOR Y=2TO12:C(X,Y)=0:NEXT Y,X:
END:END
1100 REM#red*define*section***
1110 IF I2=4 THEN I2=END(3)
1120 IF I2=1 THEN I2="H"
1130 IF I2=2 THEN I2="I"
1140 IF I2=3 THEN I2="J"
1150 REM#*pick*end*number***
1155 IC=0
1160 I=END(11)+1:IJ=END(11)+1:H=I+J
:K=C+IC+1
1170 IF C(I,J)=1 AND K>18 AND KC=
1 THEN LINE(1,160)-(200,190),PRES
ET,BF:DRAW"BM58,160":A4="PLEASE*DR
W*":GOSUB3000
1180 IF C(I,J)=1 THEN 1160
1200 REM#*clear*ans#boxes***
1210 LINE(1,160)-(200,190),PSET,
BF:C=0
1220 REM#*draw*numbers***
1230 IF I2="I" THEN GOTD1260
1240 I4=STR$(I):IF LEN(I4)<3 THEN
I="94 ELSE I=00
1250 DRAW"BM"+STR$(I)+",160":GOSUB
4000
1260 DRAW"BM102,160:ESL5FS":REM#
***
1270 IF I2="J" THEN 1290
1280 I4=STR$(J):DRAW"BM112,160":GOSUB
4000
1290 DRAW"BM120,160:R6BU4MR4BD2R4B
D2BR6":REM#***
1300 IF I2="H" THEN 1320
1310 I4=STR$(H):DRAW"BM135,160":GOSUB
4000
1320 REM#*draw*ans***
1330 IF I2="I" THEN DRAW"BM58,160"
1340 IF I2="J" THEN DRAW"BM112,160"
1350 IF I2="H" THEN DRAW"BM135,160"
1360 GOSUB2500:C=C+1
1370 LINE(20,150)-(25,160),PSET,BF:
DRAW"BM20,160"+N14(4)
1380 DRAW"BM102,145"
1390 IF I2="I" THEN IF V=1 THEN 142
0 ELSE 1400
1400 IF I2="J" THEN IF V=J THEN 142

```

Continued on page 55


```

0 ELSE 1480
1410 IF Z#="H" THEN IF V=H THEN 142
0 ELSE 1480
1420 A#="RIGHT":GOSUB3000:C(1,3)=1
:K#K+1:IF C=1 THEN SC=SC+1
1430 FOR M=1 TO C:LINE(1-1)*21+1,13
-13+10(1)-(C-1)*21+20,13-11+10+9)
,PRESSET,IF
1440 PLAY"V31240F84B8F64B8F64B"
1450 IF STR$(H)#IF LEN(14)=3 THEN
1-6 ELSE IF LEN(14)=2 THEN 1-9 EL
E 1-3
1460 DRAW"BM"+STR$(1-1)*21+20)+"
+STR$(13-1)*10+80:GOSUB4000
1470 NEXT M:GOSUB2000:GOTO1100
1480 IF VAL(14)=0 AND C=3 THEN1500
ELSE IF VAL(14)=0 AND C=3 THEN GO
SUB2000:GOTO1510
1490 SOUND1.5:A#="WONG":GOSUB3000
:GOSUB2000:IF C=3 THEN1510
1500 DRAW"BM9,145":A#="TRYAGAIN"
:GOSUB3000:GOSUB2000
1510 GOSUB1600:GOTO1320
1600 REM##clear the on gans##
1610 IF Z#="I" THEN LINE(88,140)-C(
0,150),PRESSET,IF
1620 IF Z#="J" THEN LINE(112,150)-C
124,160),PRESSET,IF
1630 IF Z#="H" THEN LINE(135,160)-C
160,150),PRESSET,IF
1640 IF C=3 AND Z#="I" THEN GOSUB20
00:1#STR$(1):DRAW"BM9,140":IF LE
N(14)=3 THEN 1-94:DRAW"BM"+STR$(X)
+",160"
1650 IF C=3 AND Z#="J" THEN GOSUB20
00:1#STR$(2):DRAW"BM112,160"
1660 IF C=3 AND Z#="H" THEN GOSUB20
00:1#STR$(0):DRAW"BM135,160"
1670 IF C=3 THEN GOSUB4000:DRAW"BM
90,145":A#="RIGHTERS":GOSUB3000:P
LAY"1600V312F64B":GOSUB2000:GOTO1
550
1680 RETURN
2000 REM##hold and clear#b###
2010 FOR D=1 TO 1000:NEXT I:LINE(88,14
5)-(150,140),PRESSET,IF
2020 IF D=12 THEN 2040 ELSE RETURN
2030 REM##draw#s###
2040 POLS: DRAW"BM100,40":A#="BOARD
FULL":GOSUB3000
2050 DRAW"BM40,60":A#="YOURSCORED#
":GOSUB3000:1#STR$(SC):GOSUB4000:
A#="GOUTOF#":GOSUB3000:1#STR$(C)
:GOSUB4000
2060 DRAW"BM70,80":A#="ONEYOUR#FIR
STTRY":GOSUB3000
2070 MIN=FIX((TIMER/50)/60):SEC=FIX
(X(TIMER/50)-(MIN*60))
2080 DRAW"BM7,100":A#="ANDSTOKE#
":GOSUB3000:1#STR$(MIN):GOSUB4000:
A#="HMIN":GOSUB3000:1#STR$(SEC):G
OSUB4000:A#="SEC":GOSUB3000
2090 DRAW"BM60,120":A#="ANDTHE#GO
YES#OR#ND":GOSUB3000
2100 A#="MAKE#":IF A#="Y" THEN RUN
ELSE IF A#="N" THEN POKE65494,0:END
ELSE 2100
2200 REM##draw#digit#number##
2210 B#="" :T1=0
2220 C#="MAKE#":IF C#="CHR$(13) THEN
V=VAL(B#):RETURN
2230 T1=T1+1:IF T1=80 THEN V=VAL(B
#):IF V=0 THEN DRAW"BM70,145":A#="
TODLATE":GOSUB3000:SOUND5,5:GOSUB
2000:RETURN:ELSE RETURN
2240 IF C#="E" THEN POLS:GOTO2050
2250 IF 1#="I" AND B#="" THEN DRA
W"BM91,160"+1#(11):FOR D=1 TO 10:N
EXT I:LINE(100,150)-(88,160),PRES
ET,IF
2260 IF 2#="J" AND B#="" THEN DRA
W"BM112,160"+1#(11):FOR D=1 TO 10:N
EXT I:LINE(124,150)-(112,160),PRES
ET,IF
2270 IF 3#="H" AND B#="" THEN DRA
W"BM140,160"+1#(11):FOR D=1 TO 10:N
EXT I:LINE(160,150)-(135,160),PRES
ET,IF
2280 IF 4#="I" OR 2#="J" THEN IF C#
<"0" OR C#="9" OR LEN(B#)=3 THEN 2
520:REPEAT#digit#number##
2290 IF C#<"0" OR C#="9" OR LEN(B#
1-4 THEN 2520:REPEAT#three#digit#
2300 B#="B+C":DRAW N#(VAL(C#)+B
#3):GOTO2520
3000 REM##draw#word##
3010 FOR A=1 TO LEN(A#):DRAW A#(ASC
(IND#(A#,A,1)-63)+"BR3"):NEXT A:RE
TURN
4000 REM##draw#number##
4010 FOR A=2 TO LEN(A#):N=VAL(MID#(
A#,A,1):DRAW N#(IND#+"BR3"):NEXT A:R
ETURN
5000 REM##a#instructions##
5010 CLS:PRINT 874,"Instructions"
5020 PRINT 878,"LEARN YOUR 2 TO 1
2 TIMES TABLE"
5030 PRINT 881,"SECTION#-1.....A
#B=C"
5040 PRINT 890,"#-2.....?#B=C"
5050 PRINT 893,"#-3.....A#?C"
5060 PRINT 896,"#-4.....RND(1,2,
3)
5070 PRINT 899,"INPUT WHICH SECTI
ON YOU WISH TO FIND '1' OR '2' OR
'3' OR '4'"PRINT 895," ":INPUTZ
5080 IF Z<1 OR Z>4 THEN 5000
5090 PRINT 892,"##?##"
5100 IF Z=4 THEN Z2=4
5110 GOTO5150
5120 IF Z#="1" THEN Z#="H"
5130 IF Z#="2" THEN Z#="I"
5140 IF Z#="3" THEN Z#="J"
5150 PRINT 890,"press enter to co

```

continued on

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```

ntinue"
5160 Z28=INKEY$:IF Z28<>CHR$(13)TH
EN 5160
5170 CLS:PRINT @74,"Instructions"
5180 PRINT @132,"INPUT THE MISSING
NUMBER          AND PRESS ENTER
"
5190 PRINT @194,"YOU HAVE THREE TR

```

```

YS AND A TEN    SECOND TIME LIMIT
EACH TRY"
5200 PRINT @292,"press enter to co
ntinue"
5210 Z28=INKEY$:IF Z28<>CHR$(13)TH
EN 5210
5220 CLS:PRINT @234,"PLEASE WAIT"
5230 RETURN

```

Tandy to Dragon Converter

From John Buckley in Stafford

MY INTEREST in writing this program began when I bought the July 1983 edition of the American magazine *Rainbow*. This issue contained a free record of three programs but these had been recorded in Tandy format and although I had no problems loading these into my Dragon they would not run.

On trying the programs the reason for this became obvious, as most of the lines appeared to be nonsense. I was puzzled by this but an article in the same issue of *Rainbow* made things a little clearer. I discovered that on both the Tandy and the Dragon, basic key words such as PRINT, FOR, NEXT are stored in memory as a one byte token.

This saves memory and also makes a Basic program execute faster. The article also contained a table of the Tandy key words and their corresponding token. I thought therefore that the Dragon tokens could be different.

I then found an article in the August issue of *Dragon User* by Rodney Jones and by using the method he described I was able to obtain a list of the Dragon tokens and I found as I had suspected that many of them were different from the Tandy.

The article in *Dragon User* also described in detail how the Dragon operates and stores its program and so I now had all

the information I needed to attempt to write a conversion routine. Incidentally I found that a function such as INT, SQR, PEAK is stored as two bytes but the first byte is always \$FF.

What I required therefore was a routine which would look at each byte of the program in turn, check if it was a token and if so replace it with the corresponding Dragon token. Being a newcomer to machine code I am sure that my approach is not the most elegant possible but it does seem to work and takes no time at all even for a very long program.

I wrote the routine with the aid of the *Dragon Editor/Assembler* from Dragon Data.

The Basic loader program is given in Listing 1. Note this in and save it as *type before you run* it as the program destroys itself in the last line. The program checks for errors in the data statements and will stop if it finds any.

If all is well the message "TANDY-DRAGON CONVERTER READY" will be displayed when the program is run. You can now load a Tandy tape and then type as a direct command EXEC 30660 (followed by ENTER of course) and you should find that the program has been converted to Dragon format.

Please note that only the key words are changed and that the value of PEAKS or POKES remain unchanged so you will

have to look through the program and alter these by hand (using EDIT) if necessary.

Program notes

The routine works by first finding the start and end addresses of the program to be converted (location 25 stores the high byte of the start address and location 26 stores the low byte. The end address is two bytes less than the contents of locations 27 and 28).

It then looks at each byte of the program in turn, skipping over line numbers and next line pointers, and checks if it is a token (value \$00 or higher) and if so it finds the corresponding Dragon token from a look-up table and places this value at that point in memory.

If the value of a byte is \$FF then this indicates a function and there is a second look-up table to deal with these. Once each byte of the program has been dealt with in this way control is returned to BASIC.

The table shown is the "Tandy to Dragon Conversion of keyboard press table, pages 328-345."

TANDY	DRAGON
264	261
263	247
261	258
247	253
258	254
253	253
181	181

```

10 CLEAR200,32579
20 FORX=32580TO32766
30 READA(1)=VAL("&H"+HEX$(X-32580+1):FORX=2
40 NEXTX
50 DATA34,36,7E,18,20,1E,8F,7F,6B,7E,19,20,04,8C,7F,69,24,14,86,04
60 DATA81,80,24,11,81,00,27,04,80,01,20,72,39,01,20,87,00,00,35,34
70 DATA39,10,8E,7F,8F,6A,84,C1,7F,27,08,20,80,85,85,87,84,20,E1,10
80 DATA8,7F,8D,30,01,6A,84,C0,80,84,85,87,84,20,01
90 DATA80,81,82,83,84,85,86,87,88,89,8A,8B,8C,8D,8E,90,91,92,93,94
100 DATA95,96,97,99,9A,9B,9C,9D,9E,9F,80,81,82,83,84,85,86,8C,8D,8F
110 DATA8C,C1,C2,C3,C4,C5,C6,C7,C8,C9,CA,CB,CC,CA,A7,8A,89,8C,8D,8F
120 DATA8B,8C,8D,8E,8F,80,81,82,83,84,85,8A,87,8D,8A,86,8C,8D
130 DATA80,81,82,83,84,8B,8C,8D,8E,8F,90,91,92,93,96,97,98,99,9A,9B
140 DATA8D,89,8A,87,94,06,83,85,95,9C,9D,9E,9F,80
150 IF CEEKX<25580 THEN PRINT"DATA ERROR":END
160 CLS:PRINT"TANDY-DRAGON CONVERTER READY"
170 NEW

```


Dragon Answers

If you've got a technical question or problem write to Brian Gedge at Dragon User. Please do not send a S&M as Brian cannot guarantee to answer individual inquiries.

Disk drives

I AM A Senior Citizen and have purchased a Dragon 32 to help me use my time sensibly. I also have a Datax 3 tape recorder which, after adjustment, gives excellent results.

My main interest is data processing and I am considering buying a disk drive, but I have been put off by articles I have read in your magazine. For example can I expect true random search and is there a danger of losing software?

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Journal of Internal Medicine 261: 105–114

All BASIC drives are, by their very nature, capable of true random access, which means to the BASIC programmer is how well the BASIC supports this. The two disk systems available for the Oregon (Premier and Oregon Data) both support serial and random access. We dealt with different commands and syntax, so it is really a matter of personal choice which system is to be used.

There is no danger of losing entries by accident jockeying physical damage to the disk itself; as disk drives are much more reliable than cassettes. Also, both systems mentioned above have the facility to verify all data, as it is saved to disk as a precaution and to produce backup files.

Crossed wires

I HAD to find out what was wrong with my joystick. I've bought an ordinary Atari joystick and dismantled the plug. When I dismantled it I didn't know which wire was for firing, or what the other wires were for.

I would be grateful if you would put an illustrated diagram with instructions in the next issue of *Science* I live.

1. **Abstract**
 2. **Introduction**
 3. **Methods**
 4. **Results**
 5. **Discussion**
 6. **Conclusion**
 7. **References**

I'M AFRAID I can't help you too much with this one. The Dropson's Joylick parts are designed for use with potentiometer-type Joylicks as opposed to switch-



type. The Basic reads the joystick's stick position by the voltage returning from the pot compared to that sent out. Analog joystick sticks are simple analog switches and cannot be connected directly to the Oregon Scientific interface. Several interfaces are available — for example, from the Museum of Science and Industry, 65 Parkington Lane, Swinburn, Massachusetts 02159, and Cambridge Computers, 8 Middle Row, Chipping Norton, Oxfordshire.

Unless you understand exactly how the two types of joy stick operate there is no simple winning job that can be done yourself!

Planting seeds

THE FIRST problem was how to access the various graphics modes using machine code, so I was happy to find the answer in *Byte* (Nov).

However, my problem now is how to generate random numbers in machine code. Is there a subroutine in the Basic Plus and if so what is the address?

Until I hear from you, the plans will keep coming from the same location.

1. **Project Name:** [Project Name]
 2. **Client:** [Client Name]
 3. **Project Manager:** [Project Manager Name]
 4. **Project Start Date:** [Project Start Date]
 5. **Project End Date:** [Project End Date]
 6. **Project Budget:** [Project Budget]
 7. **Project Status:** [Project Status]
 8. **Project Description:** [Project Description]
 9. **Project Objectives:** [Project Objectives]
 10. **Project Deliverables:** [Project Deliverables]
 11. **Project Risks:** [Project Risks]
 12. **Project Stakeholders:** [Project Stakeholders]
 13. **Project Communication Plan:** [Project Communication Plan]
 14. **Project Change Management Plan:** [Project Change Management Plan]
 15. **Project Risk Management Plan:** [Project Risk Management Plan]
 16. **Project Quality Management Plan:** [Project Quality Management Plan]
 17. **Project Resource Management Plan:** [Project Resource Management Plan]
 18. **Project Procurement Management Plan:** [Project Procurement Management Plan]
 19. **Project Stakeholder Management Plan:** [Project Stakeholder Management Plan]
 20. **Project Integration Management Plan:** [Project Integration Management Plan]

THEY ARE many ways of generating random numbers in machine code. They all depend on "seeds" and the same set of "random" numbers will be produced if the starting value of the seed is the same each time.

The following assembly language routine will return a "random" number in the "R" register and assumes that \$PC0 is a two-byte location which was set up with a suitable number for

ation of time from location 274 at the start of the main program. This method is not very sophisticated, but is short and suitable for space indexes type programs.

DATE PLANT	FORM A
5-10	LET'S GO
5-11	AND GO
5-12	LET'S GO
5-13	AND
5-14	AND
5-15	AND
5-16	AND
5-17	AND

Altering amplitude

I haven't come across a few articles on how to set up the registers to sound in machine code, but nothing on addressing the amplitude register in machine code, which would enable more interesting amplitude changes to be achieved.

1. **Answer:** ☐ **Correct** ☐ **Incorrect**

$$H^1(\mathbb{R}^n) = \{f \in L^2(\mathbb{R}^n) : \nabla f \in L^2(\mathbb{R}^n)\}$$

How often, how can I measure
progress in social work?

Richard A. Swartz
Gregory
Cassano

TO ACCESS sound in machine code, bit 3 of locations \$FF01 and \$FF02 must be cleared and bit 3 of location \$FF03 must be set. The D/A converter which is now set up for sound is addressed on the 4 MHz of location \$FF05. These six bits control the amplitude of the signal sent to the speaker. Therefore the signal or the number stored here the higher the amplitude of the sound. Being a six bit D/A converter there are effectively six different volume settings.

[illegible]

Make sure that bit 1 remains at zero as this is the printer strobe command and will cause any printer attached to behave unpredictably if left high. For the sake of simplicity, bit 0 of this function is used as the clearing data input.

Bits and pieces

COULD YOU please advise me on the following conditions:

Why is it that although the Dragon has 24071 bits of memory available to the user I cannot clear 16K for machine code, or CLEAR 16000, any address without an OMR error?

How can I transfer a machine code program from an address higher than the address I wish it to start, is you cannot `CLOADM` with a negative offset.

I wish to disable the reset button and the Sleep key, and move the rest of the keyboard operation. Can you tell me the relevant software?

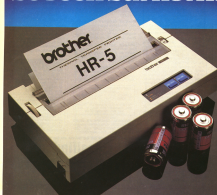
25. **Fracture**
 26. **Dislocation**
 27. **Stress**

YOUR FIRST point is quite simple. The first number is a clear statement of the amount of string space to be cleared and then the second number sets the highest memory location to be used by Basic. So to clear 15K of memory you would type **CLANG 200,16384**. In fact, clear 16384 will work and clear 16800 bytes of string space provided that the Basic program isn't too large.

Negative effects can be used in a CLAUSEM but not directly. For example, if the effect was to be `-3072` bytes, you need to type `CLAUSEM ---, 3072,-3072`. The `3072` is the important part — this produces a positive effect which will have the same effect

The third point, disabling reset, is not so simple. In a previous issue it was explained how to disable (toggle) the reset button cannot be ignored as this is a physical connection to the CPU. It can, however, be redirected — location 114715 point to the address to jump to when reset is pressed. The first instruction must be a NOP, then could be followed by JMP \$2051 which would run a program if reset is needed.

Little Brothers should be seen but not heard.



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Which is really something to shout about.

PLEASE SEND ME MORE DETAILS OF THE REMARKABLY SILENT
HR-5 PRINTER.

NAME SURNAME

ADDRESS

TEL NO.



Competition Corner

Answers to Competition Corner.
Dragon User, 12113 Little Newport
Street, London W20R 1LD

Prize

ALPHA Disc, the UK company featured in our recent pages for enhancing Canon's disk drive technology, is giving our readers a chance to win a drive of their own.

The company is offering Canon's MD211 drive to the winner of this month's competition. This is the single density, 40 track version of the 221 featured in our news. The prize comes complete with power supply.

The main difference between the two drives is that the 221 offers a choice between 40 and 80 track disks. But the 220K storage offered on the 40 track 221 should be more than enough for most Dragon users.



Rules

TO WIN the disk drive you must show both the answer to the competition and how to solve it with the use of a Basic program developed on your Dragon. As a referee I complete the following sentence in 10 words or less: "I want a disk drive for my Dragon because..."

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

March winner

THE WINNER of March's competition and recipient of a prize photograph (courtesy of Premier Micrographics) is B. Mather of Newport in Glam., who correctly stated that the most favourable choice of number was 178, which resolves to 106 in just four moves.

Win a disk drive

Alpha Disc provides the prize to Gordon Lee's puzzle

ONE OF my earliest recollections of sport was as a spectator at a mixed doubles tennis match and being a little puzzled by the umpire calling out the score, "Whitewash". My first impression was that they was some form of endorsement directed towards one of the ladies playing, but as the game progressed and the term seemed to be used somewhat indiscriminately, my confusion grew. It was only when it was pointed out the meaning of the word "love" that things became clearer. Other games too have their own distinctive terms, and if we overheard reference to "one under par", "four faults", "three no bumps", "in-audible" and "15-bow, 15-four, two for a pair, three for a run and one for his-her" we would know that the games were, respectively, golf, showjumping, bridge, backgammon and cribbage.

So far we have considered only the means of scoring, but in many games and sports mathematics is more intimately involved. For example, card games involving hands which rank in a set order, such as poker or brag, have that order determined by the statistical expectation of such a hand being dealt. Thus, two pairs are more likely to occur than three of a kind, and so consequently are regarded as

the lower hand.

Finally, mention must be made of that most traditional of pub-games — darts. It is a game which requires both mental agility in assessing the most advantageous throw especially when nearing the end of the game, and also manual dexterity when it comes to actually throwing the dart. As the game is so closely associated with pubs, it always amazes me that after a couple of pints anyone can play at all!

Consider the following incident which took place in the bar of the Mulberrycombe Arms recently. Duggins, who had just thrown three darts, announced that he had landed one in each of three adjacent sectors on the board. Muggins, who was a mathematician, remarked that knowing this, and also knowing the total score, he could work out exactly where on the board each of the darts had landed.

Duggins, however, overheard this conversation, and even though he didn't know what the total was, he was also able to deduce where Duggins' darts had landed. But then, you see, he did have the advantage of knowing how many doubles had been scored. It was a standard dartboard, and no inner or outer bull was involved. Where did the darts land?

Horace hunt



HORACE is a lovable little rogue who first appeared in a park on the Spectator's, picking the flowers and eating the keepers' lunches. Now Melbourn House is giving 20 of our readers a chance to win a copy of the Dragon version of Hungry Horace.

Just mark in Horace's path through the maze to the food and send the completed

entry to us with your name and address attached. As a bribe, complete the following sentence in less than 10 words: "I want to own a copy of Hungry Horace because..."

Your entries must arrive by the last working day in June and the winners will be announced in our September issue.

St. George now has two choices!

Red or green will slay the Dragon

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