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Win Premier Microsystems' Delta disk system

Editorial

LESS THAN HALF WAY into the year and the predictions of the home computer industry and Chinese astrologers alike are already being revealed as accurate — the year of the Dragon is truly upon us. Not only is the Dragon 32 attacking new markets, in this case the US, but new machines are being lined up to attack different markets in the UK. Add-ons offering users increased performance have already arrived.

But these add-ons are beginning to change the nature of the beast in question. Joystick jockeys and Basic beginners may be wondering where Dragon Data is going and whether they will be left behind — not exactly alone, for there are more than 50,000 Dragon 32 users, but maybe a little isolated. The answer from the company is an emphatic no — and the same goes for this magazine.

However, Dragon Data's moves into new markets certainly present fresh challenges. It may be a cliche to warn that the US scene is highly competitive, but nonetheless it is a necessary observation. Atari, Texas Instruments, Commodore and Tandy (with its similar Colour Computer) will not yield easily to any UK invader. The business market in this country will be equally unbudging. In fact it can be argued that the year of the Dragon may turn out to be a make or break one for the company.

Dragon Data has already commented that the costings on the export drive have been worked out in fine detail, down to the third decimal place. When you're talking about US sales in the region of 200,000 those decimal points soon become very whole numbers.

But the selling prices of home computers can be very flexible. Smiths cut the prices on Sinclair machines at the end of last April. There are no prizes for guessing what the boards at Menzie's announced not long after — you've guessed it, price cuts. Similarly, price reductions in the US last Christmas saw various manufacturers playing their own particular game of tit for tat. Obviously such activities can play havoc with those decimal point calculations.

In the UK business market no one machine or manufacturer has established a strong position. The number of rivals may appear threatening, but a machine as soundly developed as the Dragon 32 is for its market would threaten in its turn.

The cost of developing new micros for these markets and then promoting them is high — but not as high as the rewards. The first half of this year, for all its activity, may look more like a lull by the time 1983 has come to an end.
HI-RES

upgrade to a 51 by 24 display cartridge £25.30

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

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

HI-res is a must for serious programming.

DASM

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

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

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

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

DEMON

Machine Code MONITOR cartridge £18.95

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

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

GAMES ON CASSETTE

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PIRATES AHoy £7.95

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

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

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The Working Dragon 32 £5.95
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Enter the Dragon £5.95
Load And Go With Your Dragon £5.95
The MC6809 Cookbook (Warren) £6.25

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**Copyright routine**

WHILE PLAYING around with my Dragon 32 I came up with the following useful routine which is ideal to put a copyright on all programs written by us amateurs.

Type: 10 REM
20 REM
Next type: EXEC (39512)

Then press ENTER (twice). Garbage is produced on the screen.

LIST your program.

Next type directly:

'YOUR MESSAGE' = 39512 (in this case COPYRIGHT SHELDON SOFTWARE = 39512)

Then type:

EXEC COPYRIGHT SHELDON SOFTWARE (or 'YOUR MESSAGE') and type 'ENTER' twice.

You will now see that the message (in this case COPYRIGHT SHELDON SOFTWARE) is now at line 65535. This line cannot be edited or deleted and is hence a safe place to store your messages. You can now delete lines 10 and 20 and then type in your program.

R Sheldon, Compton, Wolverhampton.

---

**Try the manual**

I AM writing in reply to the letter from Ashley Buss on the subject of the Dragon's listing facility.

To help a program listing all that is necessary is to enter [SHIFT]@, and to continue simply press any key. Did Mr Buss not read the (albeit abysmal) manual?

Finally, a word of warning: POKEing location 65500 with zero may seriously damage your processor's health.

Glyn Heath, Stretley, Nottingham.

---

**Twice unlucky?**

AFTER THREE months use my Dragon 32 suddenly dumped an hour's typing and other ignored commands, or gave S/N ERROR to everything. I have no complaint as it was immediately replaced by the dealer.

However, the other evening I loaded a program only to find chunks of it missing. Error messages were themselves erroneous and the Dragon started printing evenly spaced lines of graphic characters across the screen. I switched off, reloaded and had no further trouble.

I remember having similar problems with one of the early calculators that was simply caused by dust getting in the works. I could seal unused ports if this is the problem, or would you think that I have been unlucky a second time?

By the way, how many other Dragon owners have sussed that Doug Dixon's Peek and Poke routine (PCW 17-23 Feb) can be used to double-load a program thereby making up for the lack of a VERIFY command?

Rodney Bennett, London W10.

---

**Bridging the gap**

THERE MUST be, by now, many users who have mastered the simple programming techniques and now want to know how the machine carries out the tasks we set.

It seems to me that there is a vast gap, for example, between those people, like myself, who know what PEEK and POKE are and do, and those who know what values to poke and where to poke them.

There seems to be no 'in-between-stage' info published.

I would like readers to consider the following program which, although simple enough in concept, raises many questions to which we were uninitiated:

10 FOR I = 32768 to 49151
20 A = CHR$(PEEK(I))
30 PRINT A;
40 FOR J = 1 TO 200; NEXT J
50 NEXT I
60 END

From examination of the additional information booklet and its memory map this program prints out the section of the memory that contains the Basic interpreter, and it is very interesting to see the entire range of commands. However, why is the last letter of each word represented by a lower-resolution graphics character?

Also, I notice three commands not mentioned in any literature that I have read, namely LLIST, DLOAD and TAB with CHR$(168). As this character only appears this once I have no way of telling which letter it represents.

What are the uses of these commands (I assume that whatever the CHR$(168) represents, the TAB function will be the normal one)?

I hope my point is clear that understanding Basic is not the same thing as understanding computers.

D L George, Shoreham-by-Sea, West Sussex.

---

**Test the leads**

IN REPLY to P A Low's cry for help over the non-recording of programs from his Dragon perhaps the fault lies with neither the micro nor the cassette recorder but with the leads that connect them.

On opening up the jack plugs on the Dragon leads he may well find the wires have not been crimped onto the plugs, this has caused strain on the soldering which has broken.

Roy D Cole, Moulton, Northants.

---

**Dipswitch changes**

I HAVE owned a Dragon 32 since last September and have found it a useful micro.

Recently I bought a SeikoSHA GP100A printer. After I had interfaced the two together I found that the LIST command (fairly mentioned in the Dragon manual) did not work as each line overwrote the previous one. To overcome this the case had to be removed and dipswitch 3 had to be moved to the ON position.

Switches 1 and 2 can be altered if you require a £ sign. I hope this information may be useful to anybody who cannot get his SeikoSHA printer working.

Andrew Pimpmerton, Wyken, Coventry.

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**Software Top 10**

<table>
<thead>
<tr>
<th>Position</th>
<th>Software</th>
<th>Manufacturer</th>
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</thead>
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<td>1</td>
<td>Donkey King</td>
<td>Microdeal</td>
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<tr>
<td>2</td>
<td>Caterpillar Attack</td>
<td>Microdeal</td>
</tr>
<tr>
<td>3</td>
<td>Planet Invasion</td>
<td>Microdeal</td>
</tr>
<tr>
<td>4</td>
<td>Space War</td>
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<td>5</td>
<td>Dragon Trek</td>
<td>Salamander</td>
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<tr>
<td>6</td>
<td>Alcatraz II</td>
<td>Microdeal</td>
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<td>7</td>
<td>Quest</td>
<td>Dragon Data</td>
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<tr>
<td>8</td>
<td>Wizard War</td>
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<td>9</td>
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<td>10</td>
<td>Madness and the Minotaur</td>
<td>Dragon Data</td>
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NUMBER ONE FOR THE DRAGON
DRAGON OWNERS CLUB

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

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

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Latest utilities: Hi-Res Machine Code Cartridges (51 x 24 screen, 10 character sets, hi-res text, sprites, etc) £25.30, Dragon FORTH and Tutorial £18.95, Telewriter £49.95, Dragon Doodles and Demos £5.00, Brainpower Seikosha Sreendump £5.95.

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

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Try your chances as an author

IF you think you’ve designed a winning piece of software and you want to try to market it yourself, a company based in Hampshire may be able to help you.

Direct Media Facilities (DMF) has set up a copying service for authors and will design inlay cards for the cassettes. The company can also give some advice on marketing.

Mark Andrews, DMF’s production control manager, said: “We’ll deal with anyone who gives us a call.”

To try and avoid any legal problems DMF is asking users of the service to sign a statement accepting responsibility for the copies produced. DMF is based in Waterlooville in Hampshire — on (0704) 68337.

Games arrive at the Midland Fair

THE MIDLAND Computer Fair, held in Birmingham’s Bingley Hall, saw an improving situation for Dragon users.

The fair, which was held over three days from April 28, had impressive displays from both Salamander and Microdeal — the two market leaders in independent Dragon software.

And other software houses traditionally associated with different micros have turned their attention to the Dragon — with both Quicksilva and Personal Software Services offering new games.

Salamander had two new programs at the exhibition — Starjammer, an arcade-style space-chase game, and an extended graphics system.

Salamander also announced that it will be selling its products in Boots — the retail chain — and in an interesting turnaround said that it will soon begin producing software for the Tandy Colour Computer. An initial order of Salamander software has already gone out to Boots.

Telesoftware lined up for summer

INTERFACES LINKING Dragons to a service known as Micronet 800 will be ready late this summer, giving users telephone access to a range of free and discounted programs.

Micronet 800 also offers electronic mail and message handling facilities, computer news, and access to the more than 250,000 pages of information stored on the Prestel viewdata system.

The leads, hardware and software needed to link Dragons to Micronet 800 will be ready this September. They will be supplied as a networking interface package costing about £50.

Other costs will cover subscription to Micronet 800 at £32 a year, and to Prestel at a cost of about £20 a year.

There is an additional charge for connections to the central computer between 8 am and 6 pm on weekdays, and up to 1 pm on Saturdays. Obviously you also have to pay for the telephone time you spend connected to the service.

In return, Dragon users will get access to free games and educational programs which they can download over the telephone. The service’s organisers say that more than 100 such listings are available, constantly updated.

In addition you will be able to send messages to other Micronet 800 or Prestel users — straight from your keyboard. And messages for you will be held on an electronic mailbox.

These messages can only be accessed with your personal subscriber number which you receive with your interface package.

Micronet 800 was launched last March and aims to pick up 100,000 subscribers in its first three years of operation. Interfaces were available for BBC micros first, others have followed.

The service is a joint project of British Telecom, Telemap, ECC Publications and Prism Microproducts.

News Desk
01-839 2449

Dragon Data goes on offensive

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DRAGON DATA’S expansion plant are going ahead, with four new machines being lined-up to extend the company’s range.

Dragon 32 owners can upgrade to 64K in the second half of May by changing boards at a cost of £75.

The 64K board will give users 48K of Ram, the rest going to Microsoft’s Basic. However, Dragon Data will also be offering some languages on cassettes, Forth and possibly Logo, giving users the full 64K to play with.

For users wanting more memory the disk drive system, available at the same time, will give 250K unformatted in an entry level system costing £275.

The 64K board will also be used inside the Dragon 64 which will cost £250—£300 and have other extras such as RS232 interfaces.

The next machine in line will still be 6809-based, but with a more upmarket performance — monitor interfaces, improved graphics, plug-in expansion, etc. This is due in September, costing under £400, followed by a business micro next year.

By then the wheel will have turned more than full circle and Dragon Data is already considering a new machine to replace the 32.

Strike the right note

IT IS now possible to get better quality and more versatile sound from your Dragon using a Sound Extension Module from JCB Microsystems.

You can experiment with harmonies and produce three-note chords with one Music command.

The module also gives games players a range of pre-programmed sound effects. These include machine guns, falling bombs and the more gentle sound of birds.

The £34.95 module plugs into the cartridge port and has no extra wires or leads. JCB Microsystems is on (0202) 423973.

June 1983 Dragon User 7
Disk market gets in gear

USERS WAITING for Dragon disk drive systems are going to have a wide range to choose from by the end of the summer.

In addition to Dragon Data's own models, drives will be available from Microprocessor Engineering (MEL) of Southampton and from the Spectrum dealer chain.

Croydon-based Premier Microsystems already has two systems available, with more to follow.

MEL's entry-level system consists of one drive, a power supply unit, controller and interface — for about £275. The disk is the smallest of the microfloppies on the market, the 3 inch MCD-1 developed in Hungary.

But MEL's Stephen Pelc pointed out that the chip in the disk controller is capable of handling up to four disk drives of any size — 3, 5¼ or 8 inches. MEL therefore plans to add other packages to the range, called Jet-Disc.

Neither MEL nor Premier is worried about Dragon Data's disks. As Pelc says: "If independents waited to see what manufacturers did we'd never do anything."

And Peter Rihan added: "The market is more than large enough for all of us."

Premier's first two systems, Deltas 1 and 2, come with a controller cartridge, cable and 5¼ inch Canon disk drive.

The entry-level system, with a 40-track, single-sided disk offering 100K of storage, costs £299.95. Delta 2 doubles the storage.

Spectrum, on the other hand, is waiting to see what Dragon Data does before introducing its Viscount systems. The first will be 5¼ inch models costing about £275.

Modem on its way from Cotswold

A THREE-MAN firm in the Cotswolds is opening a wider world of communications to Dragon users by introducing two standard interfaces for the machine as well as a modem.

From June, Cotswold Computers will be selling RS232 interfaces linking Dragons to a range of peripherals such as disk drives and printers. This will cost about £70.

A modem, also available this summer, will allow Dragons to talk to each other over the phone, so that small communications networks can be set up.

By the end of the year, the firm will also be selling an IEEE interface, extending the range of options for users even further.

Cotswold Computers can be reached on (0608) 737472.
News Desk
01-839 2449

John Symes: “It won’t cause us too many headaches”

Changes forced on Donkey King

MICRODEAL has withdrawn its highly successful game for the Dragon 32 — Donkey King.

This move follows a statement from Computer Games that it considered the name an infringement of its copyright on the title Donkey Kong.

Microdeal has agreed to alter the game which has been extensively advertised in the computer press. Microdeal, managing director John Symes said: “If they have trade-marked it, then fair enough, we are happy to comply.

“Actually it won’t cause us too many headaches, we were going to replace it anyway. Now we will call it The King.”

Champions comes up a winner

SOFTWARE HOUSE Peaksoft adapted its Champions football package to predict the winner of an important non-league game — and both the firm and the local team emerged triumphant.

The adapted version was run on a Dragon and predicted that the local team, Burton Albion, would win 3-2.

Albion did win by one goal, but the final score was 2-1. The package was also nearly right about the time of the winning goal which came in the 84th minute — just two minutes later than predicted. Two of Albion’s three scorers were also correctly forecast.

Champions sells for £6.95 for the Dragon and Peaksoft can be contacted on (0283) 44904.

One club opens as another shuts

ONE DRAGON club has opened as another closes its doors to new members — Dragon Data has finally put its club into operation while the Dragon’s Den starts to shut.

Users, who have been sending off their Dragon guarantee cards since last August, should by now have received the first issue of Dragon Data’s Stop Press.

This promises that “details of how to apply for membership of the Dragon Users’ Club will appear in the next edition of the newsletter”. Subscription for the first year will be free, commencing from the date of release of Stop Press rather than the date of returning the warranty card.

The Dragon’s Den, a far smaller club based in Luton, no longer wishes to attract new members. The group’s organiser promises that he will honour existing agreements but does not want more people to join.

He puts this down to “competition from other user groups and commercially-backed Dragon clubs”.

The RAINBOW

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

Color Computer News

“COLOUR COMPUTER NEWS” A companion magazine to “Rainbow” also devoted entirely to Dragon 32 and Tandy TRS80 color computers.

HOT CO-CO

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All four magazines include an exclusive U.K. and European supplement with Dragon compatibility charts and FREE advisory service — and a copy of “Supermarket”.

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The Dragon Supermarket

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If you own a Dragon 32, there’s no need to search through endless magazines, or contact numerous different suppliers of software, hardware and peripherals for your Dragon. Just a phone call away or a FREEPOST letter (no stamp required) away is “THE DRAGON SUPERMARKET” an ELKAN ELECTRONICS exclusive service for all Dragon 32 and Tandy color computer users.

Ask for our free mail order catalogue listing all (well, nearly all) of the very many products we distribute — games, books, software, accessories, etc. — and we will add to the list every single day.

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**SOFTek MONSTERS**

Now available from SOFTek a superb version of the Arcade game Dig Dug-Panic for the Dragon 32 called Monsters; written in pure machine code, this game features fabulous graphics and great sound effects, only £7.50 from:

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**THE DRAGON GOES FORTH**

DRAGONFORTH is here! JADE COMPUTERS are proud to announce the first implementation of FORTH for the excellent Dragon 32 computer. This version of Pig-Forth written by Gasso Software of Weston-super-Mare provides the following great benefits for the Dragon programmer:

1. A high level language that operates up to 30 times faster than Basic — you can write your own fast moving games software without resorting to machine code.
2. Define your own FORTH words from the dictionary of words provided.
3. Access to basic commands from FORTH — a FORTH word may be defined as a basic command — making it easy to draw those complex graphic characters in basic — and then manipulate them at high speed from FORTH.
4. A full 80 page manual — explaining clearly now you can use FORTH for your own programming.

SOFTek Software
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**START PROGRAMMING NOW!**

With "The Power Of The Dragon" (177pp) you can quickly and easily learn how to write, structure and debug a range of first class programs on your Dragon 32.

All aspects of programming covered and includes an easy to follow step by step guide. Why sit and watch your Dragon over you when you can make it your slave at £5.95 only plus 75p for p&p.

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Dealer Enquiries Welcome
Dungeon opens its cellar doors

The biggest Dragon users' club so far has its centre at Ashbourne — we went to talk to the Dungeon Master.

INTRODUCING THE DUNGEON Master and featuring a cast of 2,400, we bring you the Dragon Club at the Dungeon. Or rather Peter Woods, the Dungeon Master in question, brings you the club — for he is the organiser of the largest Dragon users’ club so far, with 30 new members joining every day.

Membership of the club costs £6.00 a year, or £3.25 for a six-month trial. Overseas rates are slightly higher (£8.00 and £4.25), but this has not stopped members joining from outside the UK — from Scandinavia, Germany, France, Spain and as far afield as the Arabian Gulf and Zambia. As Peter says: “The Dragon has spread its scaly wings.”

UK members range from the outer Orkneys in Scotland down to Jersey in the English Channel.

From fishing . . .

Peter is a former high-flying marketing man who has come to rest at Ashbourne in Derbyshire. When he decided to end his corporate career he moved into the fishing tackle business with two partners. He had already come into contact with computers when his marketing work took him to California’s Silicon Valley. Computerising his new business’s accounts increased his interest.

Peter explained that one of the problems with selling fishing tackle is that demand is season, with a lull at the beginning of each year. Moving into the home computer business — with high post-Christmas sales of software and add-ons — seemed an ideal way of filling this lull and combining business with pleasure.

The quality of the Dragon, and of the financial backing Dragon Data raised to go independent last year, made Peter’s mind up — hence the Dragon Dungeon, the trading branch of the business. But Peter is more than a businessman, he is an enthusiast — hence the Dragon Club. Now he devotes nearly all of his time to the Dragon while his partners look after the fishing tackle trade.

The Dragon Dungeon’s business revolves around the Dragon — it sells a wide range of software and add-ons. The latest catalogue from the firm describes more than 80 games packages, in addition to educational and business programs, and more than 10 utilities, including Automata’s Dragon Doodles and Demos, Compu- sense’s Decode cartridge and Dragon Forth from Oasis.

Peter emphasises that the Dragon Club is not a marketing outlet for the Dragon Dungeon. Members of the club receive a monthly newsletter called Dragon’s Teeth. In this Peter promises: “We’ll try to keep the reviews and articles free from commercial bias. The Dungeon may indeed stock the program, but if you think it’s lousy, then say so. If you don’t agree with the reviewer, then write in and say so.”

Peter wants members to take over the club and the magazine, with the Dungeon acting as a co-ordinating centre. Dragon Dungeon is moving into new premises and Peter plans to leave one room free for whatever members suggest the club should be doing. As he says: “We want to hear from you.” Suitably enough, the club room will be in the cellars of the new building.

... to feedback

Peter is already getting feedback from members as Dragon’s Teeth shows. The range of members’ programming tips, questions and answers is solid if not surprising. The flavour of the club is conveyed more by a tongue-in-cheek plea from a lone lonely heart, a request for help for a handicapped Dragon user, and a free advertisement for a smaller user group looking for members.

A lot of Peter’s satisfaction comes from detecting and fostering this spirit of camaraderie. But he does warn that the Dragon market is becoming big enough to attract fly-by-night businessmen — so beware.

And he also has some words of advice against copying programs: “Most of the chaps who wrote that software you’ve just forked out a fiver for sweated long hours over the keyboard. Their return is normally a royalty on the number of tapes sold. If we want to have a steady supply of new, ever-improving software we’ve got to look after the writers.”

But mostly the Dungeon is not a gloomy place. Members are already taking over the magazine, contributing reviews as well as tips, and qualifying for a range of special offers, club badges and club T-shirts. If you’re feeling particularly extrovert, you can even order a bomber jacket to let the world know that you are a Dragon owner.

Peter admits that he does expect his business to profit from the activities and reputation of the club. But in any rivalry between his business ambitions and his enthusiasm for the club, neither is the loser — instead it is his sleep that suffers. Your Dungeon Master often gets less than five hours of rest a night. Maybe the dim light in the dungeon is some kind of substitute for sleep.

Peter can be contacted at the Dragon Dungeon, PO Box 4, Ashbourne, Derbyshire DE6 1AQ — or telephone (0335) 44626.
Alien go home

John Scriven tests his hand-eye co-ordination on some arcade-type action games — and finds some winners.

This batch of recent software for the Dragon shows considerable variation, both in content and in quality. Many new software houses are advertising each month, and with such variety it is sometimes difficult to see the wood for the trees. Games can often be divided into two camps: 'skill' games that involve fast hand-eye co-ordination, and 'brain' games that involve careful, logical thought — although better games certainly involve both types of ability. This month I shall be looking at the first category which includes mainly arcade-type action games.

Alien Blitz from Gem Software, at £7.95, is a version of City Bomber. The game involves bombing a city of skyscrapers until you have enough room to land your craft. All the while, your fuel stocks are being depleted. When I loaded this program, I felt rather dubious about such a dated idea — it is not, after all, a difficult game to write, and listings have been published in magazines for some time now. This version is competent enough, and employs good graphics and sound. It also gives you the chance to climb higher or lower (in most versions you are forced to sink lower each time you cross the screen), and is a reasonable game to play the first few times, but soon becomes tiring. Although you may get some fun out of this cassette, it is rather overpriced for the type of game it is.

There are two versions of Missile Command on offer. Missile Defender from Tiger Software and Defense from Microdeal.

Before the days of 'pretty picture' arcade games like Donkey Kong, my favourite way of wasting 10p was on Missile Command. The arcade version puts you in charge of three bases protecting cities dotted across the bottom of the screen. As the game starts, alien missiles fall from the top of the screen towards the cities. As they get lower, they split into baby rockets which are just as deadly.

Your defence missiles are directed by moving a cross on the display; Instead of joysticks, the arcade version uses the rather neat idea of controlling movement by a large ball that spins under your fingers. As each screenful of nasties is successfully destroyed, another faster, more unpleasant wave descends, containing smart bombs that home in on your cities with unerring accuracy.

Smooth ride

How well do these two Dragon versions approach the graphics and speed of the original? Missile Defender is a little on the slow side, and the graphics are rather 'chunky'. If I had not seen Defense, I would have said Missile Defender was fair value for money at £3.75; however, if you can afford £8.00, then the Microdeal version is considerably more professional. The graphics are more detailed, and as the program is written in machine code, the joysticks feel smoother and more responsive. As with many of its programs, Microdeal has obtained the licence to sell an American game originally written for the Tandy Color Computer. The title frame of this game shows that it comes from 'Colorful Software', and is well worth the extra £2.25.

These two cassettes also demonstrate an important point about program information. Missile Defender contains nothing on the cassette sleeve apart from the title and the name of the supplier. Defense contains a brief description of the game, but more importantly tells you that joysticks are required. If you regularly buy games software for your Dragon, then it might be assumed that you have a pair of joysticks, but it must be frustrating to arrive home with a new tape, only to discover that you have to spend the best part of £20 before you can play it. If only all software houses would supply this basic information!

Meteor Run and Breakout are on opposite sides of one cassette — Arcade Action from Apex Trading. The games are very basic, and some children who played them compared them to old ZX81 listings — not, I feel, intended as a compliment! The cassette is, of course, only £3.95, which is not an awful lot; however, for a little more, you could buy a really exciting tape.

Space Mission from Gemsoft starts off in an exciting manner. After the introduction, a space vehicle appears on the launch pad, and there is a very nice piece of graphics as it lifts off and goes into orbit. This is when the game itself starts, and you realise, as cosmic rocks come tumbling towards you, that it is just another version of Asteroids. You can rotate your
ship to the left or right and fire at them. After they are destroyed, a wave of alien craft attacks you. This sequence is repeated until you are too badly damaged to continue. At this point, you return to the earth in a similar manner to the launch and you are given a grading according to how well you have performed.

The first few times I played this game, I was impressed by the introductory and finishing sections, but as they are not really part of the game, they become irritating and it would be nice to jump straight into the action. The active part of the game is of a reasonable standard, but it is not difficult to discover strategies to ensure a good score, and I feel that arcade experts would find it lacking in real challenge.

Packaging

Although you certainly can't tell a book from its cover, in the realm of computer software it is usually true that nicely presented cassettes containing good documentation show the same amount of thought when it comes to the program itself. For me, a good tape should contain instructions in the packaging as well as in the program. The latter should be optional viewing each time to prevent boredom, but there's nothing worse than trying to absorb complicated instructions from the screen, only to discover that you've forgotten something vital at the beginning and have to run the program again.

Salamander Software usually manages to produce interesting games and its cassettes are always neatly packaged in mini video covers containing a game description as well as detailed instructions. Grand Prix is no exception to this, and the documentation also reminds you of the by now fairly well-known POKE 65495,0 to speed up Basic programs.

It starts with the opportunity to choose one of eight motor racing circuits from around the world including Indianapolis and Brands Hatch and you can select the number of laps you wish to race. Either one or two players are allowed, and movement is controlled by the use of joysticks. The fire button combines the functions of brake and accelerator. When you are ready to begin, the selected track appears, with the cars shown as coloured dots. At easy levels of difficulty there are few problems, but the higher you go, the more difficult it is to stop your car from colliding with other vehicles or from spinning off after passing over patches of oil. When the hazards (rather too frequently in my case!), the screen flashes and in most cases, the race is over for you. I found this game entertaining, and although not my favourite, it should appeal to any budding champions with £7.95 in their pockets.

Monster Mine, another game from Gem Software, demonstrates the improvement in speed that is achieved in a machine code program. The object is to get a little figure from the bottom level of a mine to the surface while collecting as much gold as possible. This task is made more difficult (I almost said impossible, but I am assured it can be done) by monsters who tear along each level.

Some of you may like the facility to enter your name in arcade games, but be warned; in Monster Mine, some unkind personal messages are flashed on the screen if you fail for the unteenth time! The shafts to the next level are positioned at random along the passages, making this a challenging game, that needs careful planning before you make your dash for freedom from the safety of the bottom level. You are allowed the luxury of a panic button, but it can be used only once a game.

This is an original variation on maze chase programs and is one of the best from Gem, well worth the £7.95.

With all the versions of Invaders and Space Wars on the market, it is a pleasure playing a game that shows a spark of originality, even if it has limitations. Such a game is St George and the Dragon from Computer Rentals. Although it may appear to be an adventure game, it actually involves steering the hapless saint across the screen, with either joysticks or cursor control keys. Both were rather difficult, especially as there are little things like slippery bridges and fire-breathing dragons to impede your progress. I soon discovered the impossibility of swimming in a heavy suit of armour, and it was some time before I came close to rescuing the damsel in distress.

To keep you amused, there are musical interludes as you sink beneath the water or impersonate a piece of burnt toast. Instead of a skill rating, at the end you get to see how far up the Saints' league you reached. Although it is not the smoothest game ever written for the Dragon, it is worth the £6.95 to fail about in helpless laughter watching some other idiot make a worse mess of it than yourself (perhaps that's not a sainly thing to say).

Exceptions

Although it is often the case that compendiums of games combine short programs that the writers don't have the nerve to sell individually, there are exceptions. One of these is Gamestape 1 from B & H Software, containing four games, Lunar Lander, Jackpot, Blackjack and Horse Racing.

Jackpot is a fruit machine program that uses large graphics to show the spinning wheels. I don't really see the point of programs like this, as it's hardly competitive, and involves no skill to play. The only advantage is that although you can't win anything, you also can't lose real money when you play. This game is the weak point on the cassette, and Blackjack is only marginally better, although the graphics are well-conceived, While not wishing to encourage readers to blow their pocket money or house-keeping allowance on the real thing, these gambling games do seem to have their limitations, and I always have a sneaking suspicion that the computer cheats!

I have left the other two programs on the cassette to last as they really are the...
Although this time are phantoms who spring out at you. These are difficult to destroy and even though you are equipped with lasers, the best bet is to shoot, turn and run for cover behind a hedge when you see a phantom. The graphics are the smoothest I have seen on a Dragon, showing not only the hedges at each location, but their changing appearance as you turn slowly round. You get audible warning of the approach of the phantoms as well as a training program to allow you to get used to rushing round the maze. There are two types of maze in which you can play this game, and it is one of the most realistic, high-speed games that I have seen for some time, making use as it does of the sound and graphic potential of the Dragon.

US lead

It is clear that the American originators of this game have not wasted their 18 month head-start on us in 6809 programming skills, but it cannot be long before there are British games that are just as good. The extra time spent on writing in machine code is well worth it, if this is the sort of result that can be expected. Although Dragon Basic is faster than Sinclair's version, it is not really good enough for high-speed action games, and it would seem that anyone considering this type of game would do well to acquire Lance Leventhal's excellent book, Programming the 6809.

With this in mind, it is perhaps surprising that there are so few cartridges of games available for the Dragon. It is comparatively easy to blow a couple of EPROMs with a good machine code program, as Dragon Data itself has demonstrated, seeing that the cartridge port on the Dragon is one of its main selling points. This would avoid the problems sometimes encountered with the cassette interface, although I am glad to say that none of these games gave much trouble in loading.

This concludes the selection of arcade-type programs that are available. With more and more games on the shelves in the High Street, it is good to see that originality is not neglected. Friends of mine seem to prefer the maze chase games to the alien-zapping variety, and these are the games that rely on a combination of hand-eye skills and logical thinking — perhaps a pointer for the way games should go in the future.
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Putting the hyperbole aside, in practice this means the Tandy color computer, where it all started and now also the Dragon 32. It contains information programs, reviews, hints and tips of a higher standard than any general magazine.

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SUNSHINE

16 Dragon User June 1983
Jockeying to be first in the joystick race

If your joysticks are worn out, or were never up to much in the first place, you now have a wide selection to choose from — Clive Gifford looks at the range.

The most popular peripheral available for the Dragon must be the joystick. Dragon owners do not need extra memory packs or an add-on keyboard at the beginning, but some of the best arcade games need a joystick, and many utility programs benefit from control by a joystick which can be many feet away from the computer itself. In reaction to the limited choice available last Christmas, many companies, both large and small, have started producing their own joysticks for the Dragon.

There are two basic types of mechanism — switch and potentiometer. The switch type consists simply of four or eight switches aligned with the X, Y and the two diagonal axes. Moving the column in a certain direction activates a certain switch. The value given is either an 'on' or an 'off' and this type of operation can be said to be digital. The switch type, then, gives a less accurate value though it is usually more rugged, a good example of one being the Atari joystick. One variant of this type is the Mercury switch joystick which works using a similar principle to a spirit level and is found on the Atari Le Stick.

The potentiometer type allows diagonal movement and is altogether more sensitive. It gives a variable value of both the X and Y axes and can be described as an analogue operation. On the Dragon, with its extremely useful JOYSTK command, it makes sense to use a potentiometer mechanism and in fact all eight of the joysticks reviewed use this system.

None of the eight can be described as semi-professional sticks, which are usually self-centring and are of a higher quality, aimed at the serious games player. Most use a potentiometer system but with some you can choose the stiffness of action that you require.

Easy action

The actual feel of a joystick is very subjective. I prefer an easy, fast action while other people stick with a stiff joystick. But the sensitivity and accuracy of a joystick is as important and is much less subjective. To test the accuracy of the joysticks, I used several programs of my own — a sketchpad and a racing game. To test the quickness of response, I used Microdeal's Racer Ball, a Pacman-type game with a complicated maze that requires many changes of direction.

I had heard of problems encountered with joysticks not reaching the extreme corners of the screen, and in fact the sheet of instructions supplied with the Radio Shack/Tandy ones discusses this in some detail. However, none of the joysticks failed to reach any of the corners.

The first joysticks I looked at were the official Dragon Data ones. The old style joystick was a bulky affair in an unattractive case. It was poorly constructed though it had a solid stick movement and at £14.95 was a fair value. The company has phased this type out and introduced a new, much more attractive style whose construction is very solid. Unfortunately the extra quality has put an extra fiver on the price (£19.95). This new style is a lot less bulky, though it is still quite large, with the dimensions (excluding the actual shaft) being 6½ by 2½ by 1¾ inches. The actual shaft was high (1½") and its movement was stiff. The fire button, square and situated on the top-surface just behind the stick, has a nice clicking action. These were my favourite of the three types widely available through retail outlets.

The second pair I looked at were the Tandy/Radio Shack joysticks which, at the same price as Dragon Data's, are in direct competition. The Tandy ones are difficult to hold, being almost square (3 by 2½ by 1½ inches) in shape. I did not like the fire button on the front of the joystick: it is large and square shaped but with such a small pitch you hardly know when you have
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pressed it. The stick's action was not too stiff but the plastic covering on the shaft kept turning round as I gripped it. This was a little annoying and at a price of £19.95, they are not the best on the market.

**Triples**

Microdeal's efforts are the third and final pair out of the batch to be widely available retail. Its sticks bear more than a marked similarity to Midwich's and Clares', suggesting that they are all produced by the same manufacturer. Interestingly these joysticks are being sold at different prices. The only visible distinguishing feature between the pair is the screws used to secure the joystick housing.

These sticks are similar in shape to the new ones from Dragon Data and Cascom (covered later). They have a small, round firing button just below the stick which is fairly short at just over 1½ inches high. All three of the joysticks had the same stiff movement. They all worked well in the three tests though I found them rather slow on the arcade game test. The pair that came from Midwich, however, was obviously designed with the Australian market in mind. It featured a slightly different movement to any of the others: when I pushed the stick down, the item that I was controlling on the screen went up and vice versa! Thankfully, the left and right movement worked correctly, but quality control just isn't what it used to be. I'm sure, however, that Midwich's other sticks are not like my pair. The cheapest of the three sets was Clares' at £15.95, with Midwich's £15.98 plus 57p postage and packing, and Microdeal's a rather pricey £19.90.

The cheapest joysticks come from Talon Electronics. These were also the smallest in size (3½ by 2 by 1 inches) and the lightest at 4 ounces. The joystick's mechanisms are cased in the sort of box sold in electronics shops for your own personal electronic projects, with a metal top finished with enamel paint. I imagine that these sticks are home-made but there is no crime in that and in this case I think the old phrase "small is beautiful" applies. These joysticks are easy to use with an excellent spring-suspended fire button on the front side. They are small enough to hold in your hand and offer good, fast control around the screen. Their only failing is that they are a little too easy to move and this could be seen on the sketchpad program. Though they are a little unattractive, they work very well and at £15.00 inclusive of post and packing they are excellent value.

The Dragon Dungeon joysticks are priced at £19.95 which puts them in the Dragon Data/Tandy bracket. This joystick is unlike any of the others with a compact box measuring just over 3 inches long by 2½ inches wide by 1¼ inches high. The fire button is raised on the top surface of the stick and is the best of the batch reviewed. The action of the joystick is also good, with only a tiny amount of pressure necessary to sweep the shaft into any position. The whole unit has a quality feel about it. My only major complaint is that the shaft, only just over 1 inch high, was a little on the short side. Perhaps I'm biased in favour of this joystick because I achieved my highest ever score of 48,700 on Racer Ball compared to my previous high of 32,330 using other joysticks.

The last joysticks reviewed are the Cascom ones. These sticks cost a total of £15.70 including postage and compare favourably with some of the more expensive ones. They have a very similar design to the ones from Microdeal/Midwich/Clares, with the main differences being the longer shaft (at 2 inches, the longest of all the joysticks reviewed) and the much tighter feel which is somewhere between the stiff Microdeals and the easy Talon Electronics. The joystick lead was the shortest at 42 inches but this is still reasonable and can be easily lengthened. The lead on this joystick was of a much heavier duty than the others. This stick had a nice balance between the ease of movement and the accuracy. Unfortunately it was a little slower in some circumstances, but as a general joystick it cannot be beaten.

In conclusion, all of these joysticks are solidly constructed, well finished and easy to use. The best way to decide for yourself, is to try and use a few different pairs. However, if you are prepared to order your joysticks by mail, I think you will get a better deal.

**Favourites**

My favourite pairs are definitely those from Cascom, Dragon Dungeon and Talon Electronics. The Cascoms would make a good family joystick, while both the Talon and the Dragon Dungeon ones are ideal for fast-moving situations if you can get used to their little idiosyncrasies. If you prefer a stiffer action joystick then the Clares model at £15.95 must be considered.

It is a shame that no semi-professional joysticks are available as it would have been very interesting to review them against the standard types. But I'm sure that this more expensive type of joystick will start to arrive in Britain soon.

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**Joysticks reviewed: from £15.00 to £19.95**

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June 1983 Dragon User 19
Boots provides a firm footing for Dragon's future

Graham Cunningham talks to Anton Boyes of Boots the chemist, whose move into home computers has contributed to the Dragon's success.

DID YOU buy your Dragon at Boots? The chances are that for one in three of you the answer will be yes, because Boots estimates that about one-third of Dragons sold so far have passed over its counters. The chances are that you will also be a happy Boots customer - because the company reckons that fewer Dragons are returned as faulty than any other machine.

Even if you didn't buy your machine at Boots, it is a place worth checking for Dragon software and add-ons. For example, the company expects to be the first place selling the new disk drive system from Dragon Data.

Boots itself is a happy customer of Dragon Data. In the words of Anton Boyes, who is responsible for organising Boots' home computer sales: "It would be an understatement to say that we are tremendously pleased with the Dragon."

Boots' move into home computers began with less than a dozen of its larger stores selling Vic20s and Texas Instruments TI99s. In August last year the number of stores rose to 80 and the Dragon made its debut, appearing in Boots' outlets that month. More than 130 stores, covering every major city centre, stock the Dragon now, and the aim is to reach 200 before the run-up to Christmas this year.

Boots' first sight of the Dragon, in pre-production form, was in May last year. At the time Boots was looking at "everybody who was in the market" with a view to expanding its home computer sales. When they saw the Dragon they "were very impressed - it selected itself!"

According to Boyes, the Dragon beat off rivals because it was "effectively a finished product" with a large memory and high-quality graphics. The fact that the Dragon resembled a typical computer terminal, with a proper typewriter keyboard, also stood in its favour.

The BBC micros were not a proposition then because they were only being offered through retail orders. Nor was Sinclair's Spectrum ready at that time.

Central purchasing of home computers is handled by Boots stationery and book merchandise department which also covers toys. An established relationship with toy manufacturer Mettoy, Dragon Data's parent company until it went independent last November, also eased the way to acceptance.

Sales of the TI99s were slow and the system was dropped

Since that August debut, Boots' microcomputer sales, including the Dragon as its "leading line", have not looked back. The most recent estimates say that 55,000 Dragons were sold up to the end of this February. And Boyes thinks that it accounts for one-third of all Dragon sales. As Boyes says: "It is a line with which we have associated ourselves."

But Boots has no objection to anybody else selling the Dragon. It achieved its strong supply position not by contract stipulations with Dragon Data but by the size of the orders it placed for the machine.

The Dragon is only part of Boots' home computer drive. The first trials yielded "smallish sales" of the Vic20, and even fewer TI99s were sold - "not in hundreds but in dozens". The TI system was finally dropped towards the end of last year. But the August move into 80 stores, with the Dragon selling alongside the Vic20, was a success.

Boots has expanded its range since then - it began to stock the ZX81 in the run-up to
Christmas and the Spectrum in February. At the top end of the home computer market it also stocks the Commodore 64.

Last Christmas the Vic20 sold strongly, and Boots would sell more if it could get hold of them. At Christmas more Dragons could also have been sold, but the company has no complaints about supplies.

"We have had a very fair share of Dragons," Boyes said.

Boots has put as much effort into how it sells micros as into which machines to stock. Each store's home computer section is "very obviously a separate part" with enough space for a customer to experiment with all the machines in stock. The Dragon is set up with a Boots Thomson 14-inch TV and either a Bush 3150 cassette recorder or one of the two Boots models which is compatible with the Dragon.

Boyes added that sales staff have been given special training in microcomputers, ranging from going back to college to studying manuals. The training continues and is given a "high priority". The aim is for sales staff on the spot to provide "good advice that is not intimidating".

"Packaging in general often lets down the software"

Also in stock is a range of software, although Boyes said, "We thought Dragon software suppliers were a bit slow off the mark." The notable exception was Microdeal, whose Space War, Donkey King and Planet Invasion head the list of Dragon best-sellers at Boots. Utilities packages for education and games are selling more slowly, but Boyes is not discouraged by this; "They will make a market in the long-term."

He is "mightily relieved" that the standard of packaging is going up. New presentation packs for Dragon Data's software are ready — after Boots had spent some time pressing for an improvement. "The packaging in general often lets down the software," he explained.

Boots is keen to increase the range of packages it stocks. A panel of users — the Boots Computer Club, in fact, which is based in Nottingham — checks the quality of all the software before Boots will agree to stock it.

The company's hardware testing is also thorough. Out of every 1,000 machines it receives it batch tests 80. Boyes commented that customers returned fewer Dragons as faulty than any other system. He thought the failure rate "was surprisingly low for such a high technology product".

When a customer does bring a machine back, a diagnostic cartridge, supplied by Dragon Data, is used on the spot to check the major functions.

All of the Dragons sold so far are still within their guarantee periods. Boots is setting up a system of service agents to provide support when the guarantees start to expire.

The good relationship with Dragon Data is set to continue despite the fact that Boots still talks to all the major manufacturers about selling their products. At the moment the company has no plans to stock the Lynx, a major rival, considering that the Dragon remains "the home user's ideal machine".

In fact future models from Dragon Data hold more appeal to Boots. As Boyes said: "We would look very favourably at stocking any Dragon machine which falls within our market — the home user." Even the possibility of selling a bigger, business machine cannot be ruled out in the long-term.

Selling a business machine cannot be ruled out

Demand for the present Dragon is still high. Partly this is due to a backlog built up over Christmas; but Boyes also puts it down to the "idea of home computers striking a chord generally in the UK". A national advertising campaign this spring is expected to boost demand for home computers even further.

The Dragon 32 is to get a boost itself this spring. Boots will be selling the 64K upgrade along with the Dragon Data disk system as soon as it is available. The drives will cost about £275 including the controller. Boots also plans to start selling the Seikosha printer compatible with the Dragon for about £230 including the connecting cable.

So new products will not displace Boots' affection for the Dragon. As Boyes said: "We feel very close to this product." He himself feels closer still — he has a Dragon at home for practising programming and sometimes testing software.
Your chance to program and repel the aliens

Save the earth from the alien invaders with Andrew Black's Dragon version of Missile Command.

DEFEND EARTH'S FOUR remaining cities from the missiles of the alien invaders, using this variation of Missile Command. Destroy the invaders with your laser — which you move with a joystick (right) and fire using the space bar. If this is awkward, place the joystick on a flat surface and move with one hand and fire with the other.

Instructions
1. Maximum number of missiles — this is the number of missiles to be fired before the game ends
2. Skill levels — there are two types of difficulty:
   Levels 1-3: one missile at a time
   Levels 4-6: two missiles
   Levels 7-9: three missiles
3. Levels 1, 4 and 7 — you only have to be three spaces away to destroy a missile
4. Levels 2, 5 and 8 — two spaces
5. Levels 3, 6 and 9 — one space
6. Angle — this is the maximum move that a missile can make in one turn (left or right)
7. Moving — use the joysticks (or the arrow keys — as explained below)

Program notes
- Sets the variables
- Moves the Basic program
- Moves laser point
- Moves missiles and checks to see if any hit the cities
-Displays score — asks if another go is desired

Main variables
- X and Y — coordinates of your laser
- MX(Z) and MY(Z) — coordinates of the missiles
- TC — total number of cities remaining
- C(Z) — cities remaining
- B — angle of movement by missiles
- L — skill level
- S — your own particular score
- HS — high score
- M — number of missiles
- M$ — movement using keys and firing
- N — number of missiles fired
- MM — total number of missiles allowed
- J — joystick value
- NS — repeat key
- P — position of explosion centre
- W — random movement of missiles

Key movement
To move the laser with the keys (you can't move diagonally, if you do, it's harder) replace lines 270-300 with the following lines:

265 IF NS = " " THEN NS = " "
270  NS $ = INKEYS: IF M$ = " " THEN NS $ = NS
275  NS $ = M$
280  X = X + 2 * M$ (M$ = CHR$(9)) + 2 * (M$ = CHR$(8))
290  Y = Y + 2 * M$ (M$ = CHR$(10)) + 2 * (M$ = CHR$(94))
300  X = X + 2 * (X < 255) - 2 * (X < 0) : Y = Y + 2 * (Y > 179) - 2 * (Y < 0)

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Continued on page 24
RETURN FOR Z = 1 TO M

W = RND (2)

MX(Z) = MX(Z) - B \cdot (W = 1) + B \cdot (W = 2) : MY(Z) = MY(Z) + 1

MX(Z) = MX(Z) + B \cdot (MX(Z) > 255) - B \cdot (MX(Z) < 0)

IF PPOINT (MX(Z), MY(Z)) = 4 THEN 460

IF MY(Z) = 191 THEN MX(Z) = RND (255) : MY(Z) = 0 : N = N + 1

IF N = MM THEN 630

IF MX(Z) < 21 THEN C = C - 1 : C(1) = 0 : P = 10 : GOSUB 510 : GOTO 170

IF MX(Z) < 75 THEN C = C - 1 : C(2) = 0 : P = 64 : GOSUB 510 : GOTO 170

IF MX(Z) < 139 THEN P = 128 : GOSUB 510 : GOTO 630

IF MX(Z) < 203 THEN C = C - 1 : C(3) = 0 : P = 192 : GOSUB 510 : GOTO 170

C = C - 1 : C(4) = 0 : P = 245 : GOSUB 510 : GOTO 170

FOR D = 1 TO 300 STEP 3

CIRCLE (P, 191), D, 4

NEXT

PCLS 2 : RETURN

CIRCLE (X, Y), 3, 3 : RETURN

LINE (128, 179) - (X, Y), PSET

FOR Z = 1 TO M

IF X > = MX(Z) - A AND X < = MX(Z) + A THEN 610

NEXT

LINE - (128, 179), PRESET : RETURN

IF Y > = MY(Z) + A AND Y < = MY(Z) - A THEN SOUND 100, 1 : MX(Z) = RND (255) : MY(Z) = 0

N = N + 1 : IF N < MM THEN 590

PLAY "TBV3104GL3C03CDDFCCCFDECC04GL3C"

CLS

PRINT @ 256, "YOUR SCORE": S

IF S > HS THEN HS = S

PRINT @ 320, "HIGH SCORE": HS

PRINT @ 352, "DO YOU WANT ANOTHER GO (Y/N)"

SCREEN 0, 1

R$ = INKEY$: IF RS = "" THEN 700

IF RS = "Y" THEN 0

IF RS = "N" THEN END ELSE 700

CIRCLE (X, Y), 2, 2 : RETURN
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June 1983 Dragon User 25
LEARNING TO USE THE DRAGON 32 COMPUTER

This title is the latest in a new series of books which introduce newcomers to the most widely used micros in the marketplace.

Learning to Use the Dragon 32 assumes absolutely no knowledge about computers and the reader is shown even the most fundamental operations such as "switching on" and "loading a program". The book leads the reader through simple programming and then onto graphics, with several programs which show how to achieve pictures and even animation.

The user-friendly approach is consistent throughout the text—not only are program listings clearly shown, but in many cases, a photograph is included to show what the program looks like when actually loaded and run!

The book contains a number of specially written programs which show the full potential of the Dragon 32.

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DRIVING DOWN A winding road, dodging obstacles in a race against time — this may sound complicated but it can be done in a program of less than 40 lines. And once you understand how to produce a scrolling screen display you can incorporate it into your own programs to make them more exciting.

First we must sort out what different sections we will have to include in the program, and in what order we need to deal with them. The following are the major items to be considered in the development of the program in a sensible order of priority.

1) Draw the road
2) Place random obstacles
3) Put your car on the road
4) Take control
5) Test for collisions
6) Display time and distance
7) Create a way of winning the game
8) Make the program user friendly

The first question to consider is how to display a simple strip of black tarmac, although this is really no problem as we could simply print the solid black graphic block (CHR$ (128)) ten times.

60 PRINT CHR$ (128);CHR$ (128);CHR$ (128);CHR$ (128);CHR$ (128);CHR$ (128)

On the other hand, if you think a moment, you will realise that instead of having to type out CHR$ (128) ten times you can use the STRINGS function. This will create a string of specified length filled with one particular character. The improvement is carried out by defining the road strip as A$ = STRINGS$(10,128) and then printing A$ whenever you want to show this.

20 A$ = STRINGS$(10,128)
60 PRINT A$

If we now add a return line and RUN we will get a straight black road which starts at the top left of the screen and runs down the left hand side until it reaches the bottom, when the screen will automatically scroll so that printing of the road continues.

120 GOTO 20

Although this works okay most real roads are not quite like that, so what about moving the road to the centre of the screen for a start? This can easily be achieved using the PRINT TAB command to move the print position to a specified column on the screen.

60 PRINT TAB(10);A$

The road is now printed down the centre of the screen but it is still dead straight and very unrealistic, so the next step is to make the road wind about. Let’s set the start position (A) at column ten and then produce another new random variable B which is added to A to displace the print position. B is produced by RND(3) – 2 which will return -1 (1-2), 0 (2-2), or 1 (3-2), thus leaving the road to run straight, or making it deviate one column to the left or right after each calculation.

10 A$ = 10
30 B$ = RND(3) – 2 : A$ = A$ + B

Wandering

You will see that the road now winds about on the screen but beware, if you leave it to wander long enough, you will get an FC ERROR (dread the thought) if the TAB position becomes negative. Or the road will wrap around onto the next line, if it moves too far to the right, causing total confusion.

Clearly some limits need to be set for the TAB position and this can be done by checking A. We will set the left limit at 1 and the right limit at 20 (to leave enough room to the right of this to print the whole width of the road section without wrap around).

40 IF A$ > 20 THEN A$ = 20
50 IF A$ < 1 THEN A$ = 1

We now need to place our obstacles on the road — as yellow ones should be nice and easy to see we’ll use (CHR$ (159)). Variable C will be a number from 0 to 31, inclusive and the obstacles will be placed by PRINT @. Make sure that you remember to include that semicolon after CHR$ (159) or the road to the right of the obstacle will revert to green. It is essential to include the second PRINT @ statement in the line as this moves the print position down to the bottom right-hand corner of the screen so that the screen scrolls before it starts to print the next section of road.

110 C$ = RND(32) – 1; PRINT @(D + 480),CHR$ (159)); PRINT @ 511

One thing that you will soon notice is that the obstacles are not always printed on the road itself, but may appear anywhere on the screen. This is because C can be any number from 0 to 31 and therefore they can be printed on any column right across the screen.

This can be easily rectified if we make a new variable D (a random number from 0 to 11) and then add this to A which is the variable which already determines how far across the screen the road is placed, to give C instead. The limits for C are now from A to A + 10, which must fall on the road.

110 D$ = RND(11) – 1; C$ = D$ + A; PRINT @(480 + C$),CHR$ (159)); PRINT @ 511

The next stage is to put your car on the road! It is positioned near to the centre of the screen by creating a new variable E (initial value 15), adding this to 224 (a print position near the centre of the screen), and then PRINTing an inverse U at that position to represent the car.

10 A$ = 10; E$ = 15
110 D$ = RND(11) – 1; C$ = D$ + A; PRINT @(480 + C$),CHR$ (159)); PRINT @ (224 + E$),"u"; PRINT @ 511

You will notice that the car leaves a trail behind it as it travels. To be able to wipe this out after each move, we need to remember the old value of E (the last position of the car) as the new variable L.

Then, print a black space in the equivalent position on the line above — this will cover the old car as the screen scrolls. Note that it is on the line above the current car position that the trail must be blacked out, because the car actually stands still where it is positioned by PRINT @ while the road moves as the screen scrolls.

10 A$ = 10; E$ = 15; LP$ = 15
110 D$ = RND(11) – 1; C$ = D$ + A; PRINT @(480 + C$),CHR$ (159)); PRINT @ (192 + LP$),CHR$ (128); PRINT @ (224 + E$),"v"; PRINT @ 511,"v"; LP$ = E$

You should now have a winding black road with yellow obstacles on it, and a car which is sometimes on the road, but which moves more often than not is off. The next stage is to put the car under user control with the cursor keys.

It would be perfectly correct to use a series of IF-THEN checks for INKEY$ but a simpler and quicker way is to use the logical check in the line below.

70 BS = INKEY$; IF BS$ = "T" THEN 100 ELSE F = ASC (BS)$

E$ = E$ + ((F$ = 8) – (F$ = 9))

Breakdown

This line is easier to understand if it is divided into parts for explanation.

BS$ = INKEY$; (Read INKEY$ into BS$)
IF BS$ = "T" THEN 100
(E if key pressed jump on)
ELSE F = ASC (BS$)
(If a key was pressed then set variable F to the ASCII value of that key)
E$ = E$ + ((F$ = 8) – (F$ = 9))
(Increase (+1) or decrease (–1) the position of the car relative to the left side of the screen (E) according to whether the left arrow (F$ = 8) or the right arrow (F$ = 9) was pressed. This works because (F$ + 8) and (F$ – 9) will return either TRUE and 1, or FALSE and 0.

Left and right are not the only directions in which we can control movement. A simple way to provide a two-speed gearbox is to take advantage of the ability of the Dragon CPU to operate at 0.9 MHz or 1.8 Mhz. The higher speed is obtained by POKE & H$FD$7,0 and the lower speed by POKE & H$FD$6,0.

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As the Dragon 32 was never designed to run at 1.8 MHz it is possible that your particular machine may not work correctly at the higher speed due to problems with the memory. But when it will work (which is most of the time in our experience) it is a very easy way to put two speeds into games.

You will notice that it also increases the frequency of the sounds produced, but you may not realise until too late that it also distorts the cassette load/save routines so that your recordings are useless, unless you make sure you switch back to low speed first.

This program automatically ends on low speed but if you stop it with the BREAK key you might still be in high speed. If you are not sure of the current situation always POKE &HFFD6.0 before attempting to load or save.

The spacebar is used to toggle between the two speeds by setting a marker variable M to indicate the speed status with M=0 being slow speed and M=1 being high speed. If the spacebar is pressed (F=32) and the CPU is at 0.9 MHz (M=0) then speed is increased and M set to 1. Similarly if M=1 the speed is decreased and M=0 set. In practice this means that if you hit the spacebar when you are in bottom gear you go up to top gear, and if you hit the spacebar when you are in top gear you go down to bottom gear.

**Joysticks**

The second method of control, which can be used very effectively here, is the joystick. The lever can be used for left and right movement and the joystick button to change gear. The line which controls direction must be changed to suit the joysticks but it is very similar in effect to the line used for key control.

70 JY=JOYSTICK(0):
   E=+(JY<10)−(JY>50)
   JY is the value of JOYSTICK(0) (right joystick side to side axis) and E is the same as with key control. If JY is less than 10 then E is decremented and the car goes left and if JY is less than 50 then E is incremented and the car goes right.

To change speed substitute the joystick button PEEK check for spacebar detection.

80 IF PEEK(65280)=126 AND M=0 THEN POKE &HFFD7.0 M=1:
   GOTO 100
90 IF PEEK(65280)=126 AND M=1 THEN POKE &HFFD6.0 M=0
You have probably realised by now that you can drive wherever you like! Although some people may prefer it just as that, even they may want to know how many old ladies they have knocked down.

Once again we can PEEK at the screen to see what our situation is, with the easiest test being if the square the car is about to move to is not block (CHR$(128)) then END.

100 IF PEEK(1024+224+E)<128 THEN END

Full listing of the game — see text for details

A new problem has now arisen at the beginning of the game: before the screen starts to scroll the road does not reach to the centre of the screen, leaving the car stranded in the middle of a field and bringing the game to an end as soon as it starts. We therefore need to print some extra road sections at the start of the game on a 'once and for all' basis.

20 A$=STRINGS(10.128): FOR N=1 TO 16: PRINT TAB(10):A$: NEXT N
Now every time you hit an obstacle on the road, or you leave the road, the game ends. More interesting would be some way of accumulating damage to the car each time you hit something. We decided the best thing to do was to add 1 to a damage variable (DA) every time you hit a yellow block (CHR$(159)), and add 5 onto DA every time you hit green (CHR$(96)) by leaving the road. Notice that the green produced here where nothing is printed is CHR$(96) (a space), rather than the green graphic block which is CHR$(143).

Since things are getting rather more complicated it is best to put this part into a subroutine which is only reached if the character at the next print position is not black. Suitable audible warnings have also been included, and if your damage reaches 50 units the game comes to an end.

100 IF PEEK(1024+224+E)<128 THEN GOSUB 200
200 H=PEEK(1024+224+E)
210 IF H=15 THEN DA=DA+1:
   SOUND 100.5
220 IF H=96 THEN DA=DA+5:
   SOUND 50.1
230 IF DA>50 THEN 300
240 RETURN
300 END

So far the game only consists of driving down a road dodging obstacles, so why not consider the time taken and distance travelled? The TIMER is set to zero by TIMER=0 and the actual time read by the variable Ti which is set to 1/50 of the TIMER count to give seconds. Distance travelled (DI) is incremented by 1 in each round. As we want time and distance printed in the top right hand corner of the screen with T and D placed over them in a set format PRINT USING is used.

Finally the PLAY continues until at the end sounds a very short note each time you move. Using PLAY allows you a shorter duration than the minimum SOUND value of 1, and therefore does not slow execution of the program so much.

20 A$=STRINGS(10.128): FOR N=1 TO 16: PRINT TAB(10):A$: NEXT N:
   TIME R=0
30 B=RND(3)−2: A=A+B:
   Ti=INT(TIMER:50): DI=DI+1: IF
   T>T=1200 THEN 400
   PRINT (52): T=CHR$(53),USING"####": Ti: PRINT (59):
   USING"####": :DI: PRINT (511),"",LP=PRINT"255.04",B"
We still haven't given you a way of winning this game so let's look at two factors: time limit and distance travelled (damage to car has already been covered).

**Winning (and losing)**

First let's consider how to lose by running out of time. All we need to do is to add a check that some arbitrary time limit (1200 in this case) has not been reached.

30 B=RND(3)−2: A=A+B:
   Ti=INT(TIMER:50): DI=DI+1: IF
   T>T=1200 THEN 400
400 CLS: PRINT"OUT OF TIME, YOU TRAVELLED: \"DI\" METRES:"
   GOTO 1000

The next possibility is winning by travelling the full distance of the road which is 1,000 metres (well we said it was hard, just wait till you see the size of the car!).

30 B=RND(3)−2: A=A+B:
   Ti=INT(TIMER:50): DI=DI+1: IF
   T>T=1200 THEN 400
500 CLS: PRINT"YOU COMPLETED THE DISTANCE OF 1000 METRES IN:",Ti: "SECOND": GOTO 1000
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Let Topsy take the strain from machine coding

Pam D'Arcy introduces Topsy, which promises an easier method of entering machine code.

FOR THE NOVICE, machine code programming is daunting enough without the tedious business of converting hex values to decimal or prefacing hundreds of basic data statements with "&H".

This program allows you to enter the code as strings of hex with addresses in hex or decimal, leaving 12K for the actual program. Once loaded the code can be both saved and run using simple action codes.

The program came about by my wanting an easier method of entering machine code than having to convert hex values to decimal or having to prefix every byte with "&H" for basic DATA statements. However, like Topsy, "it grew" to include list routines, and EXECute facility and so on...

Flexibility

Topsy is much more flexible than for only machine code use. It enters machine code as hex strings without separators and relocates machine code to a lower load address. The standard powerful feature of the Dragon enables addresses to be input in either decimal or hex (preceded by "&H") format — as suits the circumstances of the moment.

Using Topsy, about 12K bytes is available for machine code programs (more if you omit REM and detailed screen instruction prints on entering the program). And there are no artificial machine code bounds — it is entirely under the user's control and can be altered during the program's operation.

Topsy allows facilities to be quitted (useful if you have accidentally asked for, say, the load or save facility) and limits writing to store to your specified reserved machine code area. This is for your safety as the Dragon hangs up if you attempt to write to Rom. When testing and writing to areas above Rom, I obviously corrupted something vital and lost — not once, but about four times — lengthly sets of applied program amendments. This was because I put the CSave facility out of action and hadn't saved the program prior to testing (I think I have learnt now).

Detailed descriptions on using the facilities are not described in this text as they can be read straight from the accompanying program listing, but a program synopsis may be useful.

To avoid confusion when entering the program, the letters I, O and U have not been used in variable names. Apart from the G numerics and the P and R string variables, other variables have single character names (the G, P and R variables have two character names). Variables J to R are string variables, all requiring the $ suffix, all others are numerics.

Understanding the G variables will assist you should you want to amend the constraints of the system or individual facilities within the system. These variables are initialized (subroutine lines 3370-3770) on initial entry to the program and after every memory reservation requested (action code V).

GA: Clear strings value — it is set to 650 in case any bright spark tries to find a program error by entering a full buffer of hex characters in one go. Experiment to find a suitable lower figure to match your needs. I only intend to enter an equivalent line of Assembler coding at any one time. If you are only interested in entering, say, a maximum of 25 bytes (50 characters) of hex in a single write entry, a setting of 250 is more than adequate, freeing an additional 400 bytes of store.

GB: Highest address to permit a write to... set to 32767 for reasons stated above.

GC: Current highest address available for use by the Basic program (= current lowest address reserved for machine code - 1).

GD: Calculated approximate highest address +1 that the currently loaded version of Topsy requires for the Basic program to run in.

GE - GV: Store bounds for the various facilities.

GY: The value that the string storage reservation is reset to at the end of the run — set to 200.

A list of facilities follows:

- Action code X Execute machine code: Allows any machine code currently in store to be executed (Lines 1380-1480).
- Action code L Load machine code: Allows existing machine code programs (or data saved as a machine code file) to be loaded from cassette (Lines 1190-1370).

Re-saving

Action code C Copy store to store: As machine code programs cannot be loaded at a lower address than saved from (have you tried a negative offset?), this facility allows an existing (relocatable) machine code program to be loaded, copied to a lower address and re-saved from that lower address (Lines 1490-1530).

Action Codes H, D List store: Two useful facilities for checking hex strings written in store — or for just browsing through memory. There is a hex listing (H) with 8 bytes to a line and a detailed listing (D) where each byte is displayed in hex, decimal and printable character format, one byte per line (Hex list: lines 1640-1900; Detailed list: lines 1910-2170).

End of run (Q) on main menu: Closes down routine: lines 310-390.

Subroutines: Lines 2180 onwards are various subroutines, mainly printing of titles and instructions on using facilities.

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32 Dragon User June 1983
Entering machine code

```
10 REM "THO" (CHP "D" KEV)
20 REM program starts up
30 REM number of variables
40 6032.
50 6032.
60 6032.
70 6032.
80 6032.
90 6032.
100 6032.
110 6032.
120 6032.
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Continued on page 35
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Entering machine code

2000 RETURN
2009 REM start of machine code
2010 REM file saved/printed
2011 CRLS PRINT "FILE NAME SAVED"
2012 PRINT "OK"
2013 PRINT "OK"
2014 PRINT "OK"
2015 PRINT "OK"
2016 PRINT "OK"
2017 PRINT "OK"
2018 PRINT "OK"
2019 RETURN
2020 REM instructions
2021 PRINT "CHECK THAT THE TAPE & RECORDER ARE READY FOR THE SAVE." 2022 PRINT "RECORDING WILL START ON INPUT OF THE FILENAME" 2023 RETURN
2024 REM
2025 PRINT "YOU MAY STOP THE TAPE & RECORDER AT ANY TIME" 2026 PRINT "THE TAPE WILL BE STOPPED AT THE END OF THE FILENAME" 2027 PRINT "TO COMPLETE RECORING" 2028 PRINT "RECORDING WILL BE STOPPED AT THE END OF THE FILENAME" 2029 PRINT "TO COMPLETE RECORING" 2030 RETURN
2031 REM
2032 PRINT "YOU MAY STOP THE TAPE & RECORDER AT ANY TIME" 2033 PRINT "THE TAPE WILL BE STOPPED AT THE END OF THE FILENAME" 2034 PRINT "TO COMPLETE RECORING" 2035 PRINT "RECORDING WILL BE STOPPED AT THE END OF THE FILENAME" 2036 PRINT "TO COMPLETE RECORING" 2037 RETURN
2038 REM
2039 PRINT "YOU MAY STOP THE TAPE & RECORDER AT ANY TIME" 2040 PRINT "THE TAPE WILL BE STOPPED AT THE END OF THE FILENAME" 2041 PRINT "TO COMPLETE RECORING" 2042 PRINT "RECORDING WILL BE STOPPED AT THE END OF THE FILENAME" 2043 PRINT "TO COMPLETE RECORING" 2044 RETURN
2045 REM
2046 PRINT "YOU MAY STOP THE TAPE & RECORDER AT ANY TIME" 2047 PRINT "THE TAPE WILL BE STOPPED AT THE END OF THE FILENAME" 2048 PRINT "TO COMPLETE RECORING" 2049 PRINT "RECORDING WILL BE STOPPED AT THE END OF THE FILENAME" 2050 PRINT "TO COMPLETE RECORING" 2051 RETURN
2052 REM
2053 PRINT "YOU MAY STOP THE TAPE & RECORDER AT ANY TIME" 2054 PRINT "THE TAPE WILL BE STOPPED AT THE END OF THE FILENAME" 2055 PRINT "TO COMPLETE RECORING" 2056 PRINT "RECORDING WILL BE STOPPED AT THE END OF THE FILENAME" 2057 PRINT "TO COMPLETE RECORING" 2058 RETURN
2059 REM
2060 PRINT "YOU MAY STOP THE TAPE & RECORDER AT ANY TIME" 2061 PRINT "THE TAPE WILL BE STOPPED AT THE END OF THE FILENAME" 2062 PRINT "TO COMPLETE RECORING" 2063 PRINT "RECORDING WILL BE STOPPED AT THE END OF THE FILENAME" 2064 PRINT "TO COMPLETE RECORING"

Dumping the screen content into the printer

ONCE LOADED, this position independent 51 byte machine code program may be used by issuing an EXEC statement, either through the keyboard or from within a program. It dumps the entire current content of the screen to the line printer.

Obviously, you should wish the top line of a full screen to be printed, the EXEC call must be made from within a program, as input through the keyboard will scroll the top line off the screen. Very interestingly, my first efforts were thwarted by the fact that screen text characters, except for the caps range, differ somewhat from the ASCII codes.

The program can be easily entered using the Topsy "write hex strings" facility (and be saved and tested). It can be entered at any "reserved for machine code" address in the machine — the uneven looking hex program start address on the listing arose because I entered the program through Topsy at address 27000.

The program as listed prints 32 characters to a print line. Should you wish to alter this to a 64-character print line (ie 2 screen lines per printer line), simply alter line 17 to ANDB #$3F (mc c431).

line addr objectcode label op
01 6978 B6D START LDA #$0D
02 697A B80F JSR #$00F
03 697D BE0400 LDX #$0400
04 6980 10BE0200 LDY #$512
05 6984 A680 NEXTCHAR LDA ,X+
06 6986 B17F CMPA #$7F
07 6988 220E BHI PRINT
08 698A B120 CMPA #$20
09 698C 2204 BHI NOTLOWER
0A 698E BA60 DRA #$60
0B 6990 2006 BRA PRINT
0C 6992 B160 NOTLOWER CMPA #$60
0D 6994 2502 BLO PRINT
0E 6996 B4BF PRINT ANDA #$BF
0F 699B 1F10 JSR #$00F
10 699D C41F TFR X,D
11 699F 2605 ANDB #$1F
12 69A1 B60D BNE DECOUNT
13 69A3 BD00F LDA #$0D
14 69A6 313F JSR #$00F
15 69A9 26DA DECOUNT LEAY -1,Y
16 69AB 26DA BNE NEXTCHAR
17 69AA 39 RTS output complete

June 1983 Dragon User 35
Same chips, but a different cup of Coco

How alike are Tandy's Colour Computer and the Dragon? George Saint looks inside both to bring you the answer.

A MYTH HAS developed about the Dragon's similarity to Tandy's Colour Computer. In fact the answer to the question "Is the Dragon the same as the Colour Tandy Computer?" is — "No!"

This needs qualifying, since there is a great deal of similarity between the machines, and approximately a 95 percent external similarity to the user. Unfortunately, it is the 5 percent difference that can cause all the problems to the unwary programmer — this article is concerned with highlighting the differences.

Hardware

Both the Dragon and the Coco (Colour Computer) are based on the Motorola 6809 family of chips. These are the 6809E CPU (Central Processing Unit), the MC681 SAM (Synchronous Address Multiplexer), the MC6847 VDG (Video Display Generator) and the MC6821 PIA (Peripheral Interface Adapter). These four chips together with some Ram form a surprisingly powerful computer needing very few other electrical components — it is with this concept that Dragon Data and Tandy have designed their machines.

The fact that the 6809 chip is compatible with the earlier 6800 source code, and that new addressing modes are available to the programmer, makes it the most powerful 8-bit processor generally available on the market today. The speed of the CPU is about 89 MHz (Dragon Data has changed the external crystal oscillator from 14.31818 MHz in early machines to 14.218 MHz in later machines to improve picture quality). At this speed, the relative processor execution times compare very favourably with a 4 MHz Z80A-based computer system.

The 6809 chip is a half-way house to 16-bit machines, and offers program position independence (a program will execute properly when placed anywhere in the memory map), and true program reentrancy (a subroutine can be shared by several tasks concurrently, without destroying the return address by nesting subroutines). This means that we can expect to see other high-level languages such as Pascal, Fortran and Cobol emerging on the expanded disc-based Dragons.

Pseudo colours

You may have wondered why on a colour computer, high resolution arcade games are offered in black and white, when a range of colours could be offered on a lower resolution with very little reduction in display quality. The very best arcade games are at the moment written in America for the Coco, and are converted to run on the Dragon. Unfortunately, our American cousins have an advantage over us in that they can generate pseudo colours (red, blue colour artefacts) in PMODE4 by placing the available colour pixels very close together to generate a pseudo colour on their television sets.

The catch is that the American TV
Colour Basic, but by the time this is carried out, the price gap between the two machines gets even larger.

The best improvement over the Tandy machine is the provision of a parallel printer interface instead of a serial interface. This means that high speeds of printing can be carried out, and cheaper parallel printers can be used for this purpose. A serial port for the expansion slot will probably appear in the future, so those of you who want to transmit messages over the telephone line will not be disappointed.

The connections to the expansion slot are the same for both machines, so that it is possible to run Coco cartridges (if the software is compatible).

To sum up on the hardware side, the two machines are very similar, and the TRS-80 Colour Computer Technical Reference Manual will give a very close insight to the circuitry of the Dragon, although it must be kept in mind that there are changes and close scrutiny should be made to the circuit board if hardware modifications are attempted.

Both Dragon Data and Tandy have purchased the Microsoft Colour Basic Interpreter. This is the only colour Basic interpreter available at the moment for 6809 based computers, but both companies approached the installation of the Interpreter in a different way.

Tandy originally offered a non-extended Basic machine, where the interpreter resided in memory in the region A000 to BFFF (all addresses referred to here are in hexadecimal). As an optional (necessary!) extra, the extended Rom was offered for an additional sum of money, and this slotted into memory in the region 8000-9FFF. So that both Roms worked together, 'hooks' were written into the non-extended Rom which diverted flow to the direct page, and then to the extended Rom if it was present.

The first version of the Tandy Basic (1.0) suffered a bug in the joystick routine, so that when a joystick value was accessed, garbage appeared on the screen. The later version of the Rom (1.1) corrected this fault. If a disassembled listing of the Tandy Rom is examined, there is no free space available in the 16K for extra routines.

Dragon Data on the other hand provides the full 16K Extended Colour Basic as standard. Because the entire interpreter is supplier, the coding can be more compact than the Tandy version (although there are still the 'hooks' in the same places), and it resides in the same area of the memory map as the Coco Rom (8000-BFFF).

Unused space

But a disassembled listing shows an unused space from BE7F to BFFF in the Dragon Rom and the internal routines are not all the same. A prime example of this is the keyboard scan routine.

You may have noticed that when you are typing fast, the Dragon may fail to pick up some of the letters you have typed. This will occur if a key in the same row is pressed too quickly. For example, if you press the `r' key and then any other key in the range A-G quickly, you will find the second key will be missed. If you repeat the process, but press any other key outside the range (r-G, everything will be okay.

This problem with the keyboard scan routine on the Dragon shows up when you are working in Basic, and use the INKEYS scan command. A good number of programs for the Coco use the combination of SHIFT/CLEAR key to return a value of 5C (92 in decimal), where the unshifted value is 0C. If you run the following short program, you will find that only by judicious operation of both keys simultaneously you can return this value of 5C.

10 X=INKEY;Y=INKEY:IF X=99 THEN 10
20 Y=ASC(X):PRINT Y
30 GOTO 10

Faster games

This problem does not occur with the Coco because the keyboard scan routine is different, and operates more slowly. A useful spin-off is that games which are converted to the Dragon operate much faster.

Programs written in Basic will sometimes work on both machines, but the following points must be kept in mind:

1) To load a colour Tandy Basic program and vice versa, it must first have been saved in ASCII format (e.g. SAVE "GAME.A")

2) Do not write long lines of codes (no longer than 200 characters a line if possible), because the ASCII save can in varying circumstances truncate the expanded line, and lines of words will be lost.

3) Coco machine code routines will very rarely work on the Dragon, so stay clear of Coco USR calls.

4) When making USR calls on the Dragon, you can define up to 10 USR routine addresses (DEFUSR 0-9) but the Dragon Rom has a bug in it and you can only access USR0. This means that X=USR5(0) will be interpreted as X=USR0(0). To get around this problem, define each call as USR0 just before making it, for example:

10 DEFUSR0=050000: X=USR0(0)
20 DEFUSR9=050000: X=USR0(0)

5) Keep clear of combining USR call and DEFFN. Strange errors can occur, and routines which work on the Coco will not necessarily work on the Dragon.

10 DEFNAX(X)=LEN(USR0CHR$(121+16X))
20 A=FINA(2)

This example, when used with the correct machine code routine, will draw coloured border around the screen, but on the Dragon all you will get is an FC error.

6) Do not compact the coding of Basic programs by the removal of the blank spaces, as this can in certain circumstances generate errors. Both the Dragon and the Coco suffer from this problem, but it appears more prevalent on the Dragon.

On other implementations of Microsoft Basic, removal of blank spaces does no harm, and programs are available to compact the code by this method, for example TRS80 level 2 Basic.
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Duck Shoot

From Tony Smith in Milton Keynes

THE OBJECT OF the game is quite simple: you have to shoot the ducks swimming on the pond. However, you have to do it by inputting the angle of elevation of the barrel, so that the bullet flies up and then falls on the unsuspecting duck.

All you have to do to fire is type in the angle of elevation of the computer does the rest by plotting the projectile’s path. As the gun used is double-barrelled, you have two shots at each duck. The number of shots you have had, and the number of ducks hit, are shown as dots at the top of the screen. The letters are written by use of Dragon’s DRAW command, as is the misfire message. The ducks are positioned on a random basis, and use the GET and PUT commands, rather than redraw the duck each time.

The program makes use of the Dragon’s high resolution graphics, and uses the PLAY command for a rendition of the Death March, every time a duck is hit.

Program notes

Lines 150-410 Set up the picture, and input the angle, from which the parabola of the trajectory is drawn.

Draw the misfire message.
Tell you if you’ve shot yourself, or run out of ammunition.
PUT the ducks at a random position on the pond.
Deal with the end of the duck if it is hit.

Are the title sequence.
Print the instructions.
Plot the score of ducks hit, and the number of shots had.
DRAW the score words.
5900-9870 GET the duck shape and draws the first duck.
The program takes up approximately 8K of the Dragon’s memory.

Send us your Dragon programs, beginning with a general description and then explaining how the program is constructed. Take care that the listings are all bug-free, enclosing a printout if possible. We pay £6 for each program published, double for the program of the month.
**Quilt**

From J. Hilton of St Agnes

From J. Burford of Hawkley Hall Farm

THIS PROGRAM IS designed to load the Dragon 32 direct from the hex dump without having to convert the hex dump into decimal first. It can put values into any available memory space by changing the values of A.

The amount of data must equal the number of memory locations accessed. After inserting all data correctly program can be run. When OK prompt appears, delete all this program. Then access machine code program as normal.

Program notes

Lines
10 Sets up memory accessed.
20 Reads hex value.
30 & 40 Checks if L and R = A to F and adjusts accordingly.
50 Converts to decimal.
60 Pokes memory location with decimal value.
70 Repeats for next memory location.
80 Start of data statements.

**Brainbox**

From Paul Yeandle in Poole

BRAINBOX IS THE familiar logic game which has taken many forms over the centuries. You are required to guess the exact pattern of concealed colours. In fact, this version for the Dragon 32 selects any five colours from eight, in order, and gives you 12 guesses in which to discover that hidden pattern. Any colour may be repeated as many times as the processor random number generator decides.

The colours used are the eight natural colours of the Dragon and, consequently, a black background is necessary.

Unlike many computers which have keys already marked with colour names, the Dragon is lacking. I have taped a small piece of card above the 1 to 8 keys on my machine, carrying coloured squares as follows:

1 = green  
2 = yellow  
3 = blue (dark)  
4 = red  
5 = buff/white  
6 = cyan/light blue  
7 = magenta/mauve  
8 = orange

This facility can obviously then be used in other programs. It is actually an improvement on other machines which show only the colour names and not the colours.

To play the game, the player presses five colour keys resulting in five coloured squares appearing in a vertical line on the screen. When all five have been selected, the program responds with an assessment of the guess.

At the foot of the screen, for each colour guessed correctly in its right position, a black square appears. For each other colour guessed correctly but in the wrong position, a white square appears. After several guesses, if the player receives five white squares, he knows he has the correct colours but that some are in the wrong positions.

After 12 unsuccessful attempts, the program displays the hidden pattern. This pattern can be displayed at any time should the player wish to concede, simply by pressing the ? key. This key was used since it requires the shift key also to be depressed and is therefore unlikely to be touched accidentally.

**Arrays**

G Colour codes of the guess.
M Colour codes of the hidden line.
R Indicators showing which positions have been counted for black squares, i.e. which colours are guessed in the correct positions.
W Indicators showing which positions have been counted for white squares, i.e. which colours are correctly guessed but in a different position from that in the hidden line.

**Variables**

AS Multipurpose in setting up the screen and accepting guesses from the keyboard.
BS Blanks used for masking parts of the screen display.
C Number of colours from which to select (eight).
J Loop count (one to five).
K Loop count (one to five).

**Machine code loading**

```
10 FOR A = 1540 TO 1549: READ BS
20 L = ASC(LEFT$(BS,1)) : R = ASC(RIGHT$(BS,1))
30 IF L = 65 OR L = 66 OR L = 67 OR L = 68 OR L = 69 OR L = 70 THEN L = L - 55 ELSE L = L - 48
40 IF R = 65 OR R = 66 OR R = 67 OR R = 68 OR R = 69 OR R = 70 THEN R = R - 55 ELSE R = R - 48
50 T = L * 16 + R
60 POKE A,T
70 NEXT
80 DATA FF,EE,DD,01,BE,67,0B,C0,9A,3B
```

5 REM COLOURFUL QUILT
10 CLS
20 SET(RND(63),RND(31),RND(88))
30 GOTO 20

**Program listed on page 42**
**Wizard Software**

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10 ' *** BRAINBOX ***
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30 ' *** P. YEANDLE ***
40 ' *** POOLE ***
50 ' *** (C) ***
60 ' ******************
70 DIM R(10), W(10), M(10), G(6)
80 CLS 3
90 PRINT @ 76, "BRAINBOX":
100 PRINT @ 128, "YOU HAVE TO GUESS THE HIDDEN"
110 PRINT "PATTERN OF 5 COLOURS CHOSEN FROM 8"
120 PRINT @ 256, "YOU HAVE 12 TRIES TO GUESS THE CORRECT ARRANGEMENT"
130 PRINT @ 352, "ANY COLOUR MAY BE REPEATED ANY NUMBER OF TIMES"
140 GOSUB 1000
150 CLS 0
160 PRINT @ 32, "THE COLOURS YOU MAY CHOOSE ARE "
170 FOR C=1 TO 16
180 : PRINT @ 64+C*32, CHR$(127+C)
190 : PRINT @ 68+C*32, C
200 NEXT C
210 PRINT @ 352, "THE NUMBERS REPRESENT THE KEYS"
220 PRINT "YOU MUST PRESS TO CHOOSE THAT COLOUR"
230 GOSUB 1000
240 CLS 7
250 PRINT @ 64, "AT THE FOOT OF THE SCREEN, YOU"
260 PRINT "WILL BE GIVEN AN ASSESSMENT OF"
270 PRINT "HOW GOOD IS YOUR GUESS TO THE HIDDEN LINE"
280 PRINT @ 224, CHR$(128); " MEANS A COLOUR IS IN THE RIGHT PLACE"
290 PRINT @ 322, CHR$(257); " MEANS A CORRECT COLOUR HAS"
300 PRINT " BEEN CHOSEN BUT IT IS IN THE WRONG POSTION"
310 GOSUB 1000
315 A$="": CLS 0
320 ' *** SET UP THE SCREEN ***
330 ' 340 '
350 FOR R=0 TO 28
360 : A$=A$+CHR$(131)
370 NEXT R
380 PRINT @ 291, A$; "$=
390 FOR L=0 TO 4
400 : PRINT @ L*64, CHR$(65+L)+CHR$(128)+CHR$(138)
410 : PRINT @ L*64+34, CHR$(138)
420 : PRINT @ L*64+26, CHR$(133)
430 : PRINT @ L*64+58, CHR$(133)
440 : IF L>4 THEN PRINT @ 354+L*32, "$; ELSE PRINT @ 482, LEFT$(S$, 25)
450 NEXT L
455 PRINT @ 290, CHR$(133); PRINT @ 314, CHR$(135)
460 PRINT @ 59, "BRAIN"
470 PRINT @ 124, "BOX"
480 PRINT @ 155, LEFT$(A$, 5)
490 PRINT @ 379, "PRESS"
500 PRINT @ 413, "?"
510 PRINT @ 444, "TO"
520 PRINT @ 475, "STOP"
530 C=S=S; B$=""
540 '
550 ' *** START ***
560 '
570 FOR R=1 TO 5
580 : M(R)=RND(C); B$=B$+CHR$(128)
590 NEXT R
600 FOR M=1 TO 12
610 : FOR K=1 TO S
620 : R(K)=0; W(K)=0
Continued on page 44
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Machine clock

From Ian Nicholson on Merseyside

HOW MANY TIMES have you glanced at your watch after staring at a flashing cursor for hours on end, only to find that you have missed your favourite TV program? Well now you can change all that with this program for a real timer. You get a permanent on-screen display in hours, minutes and seconds, which will even run while any Basic program is running.

The program, written completely in machine code, must be entered from locations 512 to 599. The listing is given in hex to help you follow the program if you know anything about machine code. You can enter it directly into your Dragon with a hex monitor, or by using the following short program:

```basic
10 FOR I=512 TO 599
20 PRINT I;
30 INPUT P: POKE I, P
40 NEXT
```

You must not forget to precede each number with "&H" to let the computer know you are dealing with hex numbers. Enter the numbers carefully — any mistake will have disastrous effects.

As it stands the program will still not run, as the control system does not pass through it. You must alter the jump address at 010D. Since the Basic interpreter passes through this address, any attempt to change it using "POKE" will crash the system.

Fortunately a short machine code routine will do the job:

```assembly
15000 CC
15001 02
15002 00
15003 FD
```

Ian Nicholson
Millipede

From Keith Hunniford in Antrim in Northern Ireland

MILLIPEDE is a fast graphics game in which you are a millipede and get home. You have to cross a flowerbed scattered with deadly slug pellets. Left and right arrow keys are used for movement and the scoring is based on how many steps you take. Your score is displayed at the end of the game and every 100 points gained the millipede becomes closer together.

Program notes
Lines
10-30 Credits
40-140 Instructions
170 Sets up variables.

180 Increases score.
190-200 Calculate distance between pellets.
220 Checks to see if millipede bumps into pellet.
230-240 Auto repeat keyboard scan.
250-260 Keep millipede on screen.
280-300 Change slug pellet positions and keep slug pellets on screen.

Score, etc.

10 '---------------------------------
20 'BY KEITH HUNNIFORD
30 '---------------------------------
40 CLS
50 PRINTTAB(5);"YOU ARE A MILLIPEDE"
60 PRINTTAB(5);"YOU HAVE TO CROSS"
70 PRINT TAB(5);"THE ROSE BED"
80 PRINT
90 PRINT"beware of the."

100 PRINT
110 PRINTTAB(10);"slug Pellets***??***"
120 PRINTTAB(10);"<—MOVEMENT—>"
130 FOR K=1 TO3:PLAY"T10GEFFEE";NEXTX
140 CLS 1
150 A=1000:B=4900;E=1
160 PLAY"T255L25505C"
170 PRINTA+256;"~v~
180 B=B+1
190 D=ABS(10-(B/100))
200 IF D<5 THEN D=5
210 PRINT@P,CHR$(159);:PRINT@P+D,CHR$(159);:PRINT@511,""
220 IF PEEK(1024+257+A)=159 THEN GOTO320
230 IF PEEK(343)=223 THEN A=A-1
240 IF PEEK(344)=223 THEN A=A+1
250 IF A<>B THENA=0
260 IF A>29 THEN A=29
270 IF RND(2)<1.2
280 IF F=1 THEN P=P-1;ELSE P=P+1
290 IF P>482 THENP=482
300 IF P+D>510 THEN P=500
310 GOTO160
320 PRINT"YOU ATE a slug pellet"
330 PRINT"you are dead"
335 PRINT"YOU GOT :";B:" STEPS
340 PRINT"ACROSS THE FLOWER BED"
350 PRINT"THE ROSE BED"
360 PRINT"YOU ARE A MILLIPEDE"
370 PRINT"YOU ATE a slug pellet"
380 PRINT"you are dead"
385 PRINT"YOU GOT :";B:" STEPS
390 PRINT"ACROSS THE FLOWER BED"
395 PRINT"THE ROSE BED"
400 PRINT"YOU ARE A MILLIPEDE"
405 PRINT"YOU ATE a slug pellet"
410 PRINT"you are dead"
415 PRINT"YOU GOT :";B:" STEPS
420 PRINT"ACROSS THE FLOWER BED"
425 PRINT"THE ROSE BED"
430 PRINT"YOU ARE A MILLIPEDE"
435 PRINT"YOU ATE a slug pellet"
440 PRINT"you are dead"
445 PRINT"YOU GOT :";B:" STEPS
450 PRINT"ACROSS THE FLOWER BED"
455 PRINT"THE ROSE BED"
460 PRINT"YOU ARE A MILLIPEDE"
465 PRINT"YOU ATE a slug pellet"
470 PRINT"you are dead"
475 PRINT"YOU GOT :";B:" STEPS
480 PRINT"ACROSS THE FLOWER BED"
485 PRINT"THE ROSE BED"
490 PRINT"YOU ARE A MILLIPEDE"
495 PRINT"YOU ATE a slug pellet"
500 PRINT"you are dead"
505 PRINT"YOU GOT :";B:" STEPS
510 PRINT"ACROSS THE FLOWER BED"
515 PRINT"THE ROSE BED"
520 PRINT"YOU ARE A MILLIPEDE"
525 PRINT"YOU ATE a slug pellet"
530 PRINT"you are dead"
535 PRINT"YOU GOT :";B:" STEPS
540 PRINT"ACROSS THE FLOWER BED"
545 PRINT"THE ROSE BED"
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Please cut out and send this form to: classified Department, Dragon User, Hobhouse court, 19 Whitcomb street, London WC2
Musical Dragon

10 CLS: PRINT239,"MUSICAL DRAGON:"
20 PRINT238,"PLAY YOUR TUNE USING LETTERS A-K ON THE KEYBOARD. YOUR TUNE IS AUTOMATICALLY RECORDED—JUST PRESS R TO REPLAY"
30 DIM F(1000): C=8
40 POKEH257,0
50 IF Peek(307)<>255 THEN 58
60 CS: 141
70 REM:"INSTRUMENTS"
80 IF $="S" THEN SOUND 69.1:N=99
90 IF $="S" THEN SOUND 187.1:N=117
100 IF $="S" THEN SOUND 124.1:N=124
110 IF $="F" THEN SOUND 130.1:N=130
120 IF $="G" THEN SOUND 144.1:N=144
130 IF $="G" THEN SOUND 156.1:N=156
140 IF $="J" THEN SOUND 169.1:N=168
150 IF $="K" THEN SOUND 175.1:N=175
160 PCLS: IF $="R" THEN 190
170 PEEK 337.191
180 GOTO 58
190 FOR I=1 TO C: SOUND P(I).1: FOR Z=1 TO 3: NEXT Z: NEXT I
200 POKEH255,0

Sine waves

From F G Holliman of Harrogate

THE PRINCIPLE THAT any wave can be regarded as the sum of a series of sine waves of different frequencies, amplitudes and phases is of very great importance.

In this program, parameters are entered for individual waves (130) which are calculated (180) and displayed (190). The loop 310-360 generates the sum of the waves: for each X, Y for each wave is recalculated (320), summed (330), proportioned to scale (340) and displayed (350).

Try, for example, building up a square wave by summing a wave and its odd-numbered harmonics in different proportions.

1 REM**************************
2 REM SINE WAVE ADDITION
3 REM**************************
4 REM BY F.G. HOLLIMAN 3/83.
5 REM**************************
10 CLS: PRINT239,"sine waves and their addition"
20 PRINT238,"" THIS PROGRAM SHOWS THE EFFECT OF"
30 PRINT238,"ADDING SINE WAVES WITH DIFFERENT"
40 PRINT238,"FREQUENCY,AMPLITUDE AND PHASE"
50 PRINT238,"AS IN THE TONES OF DIFFERENT"
60 PRINT238,"INSTRUMENTS"
70 FOR D=1 TO 5000:NEXT D
80 N=0:Y=0:A=0
90 CLS:N=N+1:PRINT @32,"ENTER FREQUENCY IN ROTATIONS PER"
100 PRINT@64,"SCREEN WIDTH,AMPLITUDE AS"
110 PRINT239,"A FRACTION OF HALF SCREEN HEIGHT"
120 PRINT238,"AND PHASE DIFFERENCE IN DEGREES"
130 PRINT238,"FOR WAVE NUMBER":N::INPUT F(N):INPUT A(N):INPUT P(N)
140 FOR D=1 TO 2000:NEXT D:CLS
150 MODE4,1:SCREEN1,1
160 LINE-(0,96),PSET
170 FOR X=0 TO 255
180 Y(N)=96-96*A(N)*SIN(X*.2866*F(N)/256+P(N)/57.296)
190 LINE-(X,Y(N)),PSET
200 NEXT X
210 FOR D=1 TO 5000:NEXT D:CLS
220 PRINT238, "ANOTHER WAVE?":::INPUT A#
230 IF LEFT$(A#,1)="Y" GOTO 90
240 PRINT@64,"THE SUM OF THE":N:" WAVES ENTERED"
250 PRINT239,"WITH THE FOLLOWING PARAMETERS"
260 FOR M=1 TO N:PRINT F(M),A(M),P(M):NEXT M
270 PRINT"WILL NOW BE PLOTTED AMPLITUDE"
280 PRINT"SCALED TO HALF SCREEN HEIGHT"
290 FOR D=1 TO 5000:NEXT D:CLS
300 MODE4,1:SCREEN1,1:LINE-(0,96),PSET
310 FOR X=0 TO 255:Y=0:A=0:FOR M=1 TO N
320 Y(N)=A(M)*SIN(X*.2866*F(M)/256+P(M)/57.296)
330 Y=Y+N(M):A=A+A(N):NEXT M
340 YS=96-96*Y/A
350 LINE -(X,YS),PSET
360 NEXT X
370 FOR D=1 TO 5000:NEXT D
380 PCLS: PRINT "ANOTHER DISPLAY?":INPUT A#
390 IF LEFT$(A#,1)="Y" THEN 300
400 PRINT "ANOTHER SET?":INPUT A#
410 IF LEFT$(A#,1)="Y" GOTO 70
420 END

From Roger Walton in Bury St Edmunds
A SHORT MUSICAL program for the Dragon which uses an auto repeat key routine to enable tunes to be played at the Dragon keyboard.

Program notes

Lines

10-20 Instructions.
30 Sets up array for recording tune.
40 Sets processor to high speed.
50-160 Check keyboard and play notes or commence replay.
170 Allows second key to function before first is released.
190 Tune replay routine.
200 Resets processor to normal speed.
Let's face it — the sound from your Dragon 32 wouldn't win any prizes at an Eisteddfod. What you need is a:

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Errors Identified

WHILE I was attempting to convert and key in a Sharp program into my Dragon 32, I accidentally came across a new Dragon error code. This new error code, which was displayed on my screen, was UF error.

When seeing this unfamiliar error code I immediately attempted to look it up in my manual, but after discovering it was not there, I decided that you might be able to help. Can you?

Andrew Pidgeon, Haverhill, Suffolk.

The UF error you have encountered is an Undefined Function error. This occurs when you call up a function that does not exist. For example, if you have a line A = FNS (variable) and have not already defined the function in a DEF FNS statement you will get this error.

The other error code which is not covered in the manual is a DN error, this being a Device Number error, which will occur if you call up a device which is not linked up. For example, PRINT # - 3 will give you a DN error as no such device exists on your Dragon at present.

Dragon Club opens

I HAVE a Dragon 32 which I purchased in February this year. As part of the package enclosed with the computer was the guarantee. On the bottom edge of this card were the words: “Every purchaser of a Dragon 32 computer will be made a free member for 12 months of the Dragon Club.”

Since I sent off the guarantee some four weeks ago I’ve heard nothing. My question is: “Is this another of those ‘get your money’ and forget the purchaser deals we hear about so much?”

J. Jones, Wigan, Lancs.

This is not another of those “get your money” deals and you should have now received your first issue of the Stop Press newsletter from Dragon Data. There were, unfortunately, delays with the first issue.

Users who returned their warranty card before the date of release of Stop Press will still have one year’s free subscription, starting from the first issue of Stop Press rather than the date of the warranty card. Users who have not yet received Stop Press should contact Dragon Data with details and proof of purchase and they should then be put on the mailing list.

Machine coding

I WOULD like to know if there are any machine code books for the Dragon 32, which would be suited to an absolute beginner. I am sure many other Dragon users would like to have this information.

R. M. Patel, Wembley, Middlesex.

There are very few books on machine code for absolute beginners. A good general book is Programming the 6502 by Zaks and Lablak, published by Sybex, priced £12.95. This should be available from good bookshops and computer dealers.

For anyone contemplating learning machine code it is advisable to have an Editor/Assembler such as that provided on cassette by Dragon Data. If you have problems learning machine code I suggest you contact your nearest computer club whose members may be able to advise you.

Joystick wiring

I HAVE heard that it is possible to use Atari and several other joysticks with the Dragon simply by changing the plug. Could you give any advice about this and if possible publish a wiring diagram for the Dragon 32 plug?

J. C. McGuckin, Markyate, Herts.

Should you NOT wish to use Dragon joysticks then you may connect other joysticks using a 5 pin DIN plug. The Dragon joysticks contain two 10K potentiometers and joysticks of a similar type should be compatible. The connections are as shown in the diagram.

Interfacing sought

I WOULD be very grateful if you could give me any information and addresses of where I could get a Dragon interface for controlling other objects using a program, for example for switching lights on and off or controlling a robot. Also, I would like to know if anybody manufactures modern for the Dragon.

G. Page, Tollesbury, Essex.

I AM not aware of any company that makes the type of interface you require, or a modem for connecting through to other Dragons.

It should be possible to make your own interface for controlling lights via the printer port. Dragon Data is unable to supply details of the interface circuitry required but can supply the circuit diagram of the Dragon’s I/O ports as an application.

Should you require a modem for connecting to Prestel etc. then Micronet 800 will be providing an acoustic coupler as part of its system.

Inhibiting Break key

The BREAK key on the Dragon is placed near the horizontal cursor keys and cursor-controlled games often halt because the Break key is touched in error. I have tried testing for the Break key with INKEYS but it is not fast enough.

Can I POKE somewhere to inhibit the Break key?

Tom O’Brien, Woodford Green, Essex.

It is possible to disable the Break key with INKEYS strings but you use an input statement such as INPUT AS that will not be disabled. To set up the disable Break key you should use the following POKEs string in the order given:

POKE 411, 228
POKE 412, 203
POKE 413, 4
POKE 414, 237
POKE 415, 228

Then to disable the Break key use: POKE 410, 236, or to then enable Break key use: POKE 411, 57.

Right Rainbow

The correct address for Elkan Electronics, which distributes The Rainbow, is 11 Rukey New Road, Prestwich, Manchester M25 6LZ. Tel: (061) 798 7613.
Competition Corner

Digging down to the roots

Gordon Lee tests your skills — Premier provides the prizes.

ASK A FRIEND to write down any large number — one with, say, eight or more digits. Now tell him to mix up the same digits to form a second number, and get him to subtract the smaller number from the larger.

For example: 72104913
14397210
-----
57707703

Now, tell him to cross out any single digit of the answer, except for any zero, and read out to you the remaining digits. So, in the above example, if he crossed out one of the sevens he would read out "five, seven, zero, seven, zero and three". You then instantly tell him the missing digit.

Here's how you do it! As he reads out the digits you mentally add them up. So in this case you would add:

5 + 7 + 0 + 7 + 0 + 3 = 26

As this total is itself more than one digit, then continue to add together the digits until only a single digit remains. So:

2 + 9 = 11 = 1 + 1 = 2

This is your key digit and to find out the missing number that your friend crossed out simply subtract this key digit from 9. Amazing!

In fact, this trick relies on a very important principle in the field of mathematic puzzles — that of digital roots. The digital root — or DR — of a number is found by repeatedly adding the digits of that number until a single digit remains. Probably the most well known use of the DR is in determining if a large number is exactly divisible by either 3 or 9. Only numbers whose digital root is exactly divisible by 3 are themselves divisible by 3, and similarly, only numbers whose digital root is 9 are exactly divisible by 9.

For example, take the number: 17349872014112876

This has a digital root of 8, so we know that this number is not a multiple of either 3 or 9. We also know that if we were to divide the number above by 9 we would have a remainder of 8, and, similarly, if divided by 3 would give us a remainder of 2 (8 = 3 = 2 plus 2 remainder).

Similarly all perfect squares have digital roots of either 1, 4, 7 or 9; all triangular number have digital roots of 1, 3, 6 or 9; and perfect numbers (with the exception of 6 — the lowest) are believed to have a digital root of 1. So we can say, without working it out, that the above number is neither 'square', 'triangular' nor 'perfect'.

Note though that a digital root will not prove that a certain number does not fit one of these categories, only that it does not.

No jokers

The principle can be transferred, for example I have in front of me an ordinary deck of playing cards from which I have removed the jokers, picture cards and tens. So I have left 36 cards, the ace to nine of each of the four suits — hearts, clubs, diamonds and spades. I also have handy a number of plastic counters.

I have shuffled the cards and have dealt out four of them face upwards on to the table. These are a spade, a diamond and two hearts. I then multiply together the values of the cards (ace equals 1), and note the product obtained. This counts as one operation and so I put down one counter.

If the product so obtained consists of more than one digit, then I repeat the procedure with this number until only a single digit (or zero) remains. This is rather like finding the digital root except that here we are multiplying rather than adding the digits.

As an example, if my cards were A, 4, 4 and I would write:

1 x 4 x 4 x 9 = 144 = 1 x 4 x 4 = 16 = 6

This has taken three operations, so I would also have three counters on the table.

However, with the cards that I have dealt, I find that I end up with six counters. If the lowest card is the spade — what cards are on the table?

Send your answers to Competition Corner, Dragon User, Hobhouse Court, London WC2 7HF

Prizes

The PRIZE THIS month is the new Delta 1 disk operating system, donated by its developer Premier Microsystems. The package consists of a controller cartridge and 40-track, single-sided Canon disk drive, along with interconnecting cable and manual. The system provides 100K of storage.

Rules

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

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

I want to add a disk operating system to my Dragon in order to

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

Please send your entries to Competition Corner, Dragon User, Hobhouse Court, London WC2 7HF.

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51 x 24 DISPLAY
The DRAGON 32 is an incredibly powerful and versatile computer, but for text editing it has some major drawbacks. The small 32 character by 16 line screen format shows you too little of the text and, combined with its lack of lower case letters, bears little resemblance to the way text really looks on the page. Reverse video in place of lower case just adds confusion.
Telewriter eliminates these shortcomings with no hardware modifications required. By using software alone, Telewriter creates a new character set that has real lower case letters, and puts 24 lines of 51 characters on the screen. That's more on-screen characters than Apple II, Atari or TRS-80 Model III. That's more than double the DRAGON 32's standard display.

FULL SCREEN EDITOR
The Telewriter editor is designed for maximum ease of use. The commands are single key (or single key plus control key), fast, and easy to remember. There is no need to switch between insert modes and delete modes and cursor movement modes. You simply type. What you type is inserted into the text at the cursor, or on the screen. What you see on the screen is always the current state of your text. You can move quickly through the text with one key cursor movement in all 4 directions, or press the shift key simultaneously for fast, auto-repeat. You can jump to the top or bottom of the text, and beginning or end of a line, move forward or backward a page at a time, or scroll quickly up or down. When you type past the end of the line, the wordwrap feature moves you cleanly to the next.
You can copy, move or delete any size block of text, search repeatedly for any pattern of characters, then instantly delete it or replace it with another. Telewriter gives you a tab key, tells you how much space you have left in memory, and warns you when the buffer is full.

The only one with all these features for your DRAGON 32

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<td>Sophisticated full-screen editor</td>
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<tr>
<td>Real lower case characters</td>
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<td>Works with any printer</td>
<td>Special MX-80 driver</td>
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