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International edition

The independent Dragon magazine

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How to submit articles

The quality of the material we can publish in
Dragon User each month will be a very great
subject depend on the quality of the
discoveries that you can make with your
Dragon. The Dragon computer was launched
off to the market with a powerful version of
Basic, but with very poor documentation.

Articles which are submitted to Dragon
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a copy. If you need to have your program
returned you must include a stamped,
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Editorial

LUCIDATA of Cambridge has a new interface for the Dragon which can feel it into thinking it's a BBC B.

What that means is that Dragon owners can make use of the wide variety of peripherals designed for the BBC.

Your Dragon can control a digitiser, a robot arm, a Permaplot plotter — the list is too long to go through here.

Compuserve has produced a modem package with software which lets Dragon users contact bulletin boards, electronic mail services and Pretext.

Wintarsoft — a company which has been silent for too long — is back with another game for the Dragon: and it sounds like it should be a winner, too.

But there are an awful lot of companies out there who used to be hard at work selling products for the Dragon who seem to have just disappeared.

Granted, many of them have run into financial difficulty and gone under — but a lot haven't. They have, quite simply, decided that Dragon software isn't worth their while doing any more, and have moved on to more profitable ventures.

All the more reason, then, why we should support those companies that still support us.

But it's difficult to work out which is worse — dropping out of the Dragon market because the potential profits are no longer large enough to satisfy, or staying in, continuing to work on the Dragon — but not telling anyone about it.

Every time a comment appears in Dragon User such as "why is nobody doing a disk doctor for the Dragon?" letters arrive from irate readers telling us all about various companies who are doing just that.

Sometimes there is a failure of communication.

If you have something for the Dragon, then tell us about it. You can't expect to sell products if you don't publicise them.

Our readers have been loyal to the Dragon for a long time — somebody should start doing something for them in return. Don't keep things to yourselves — Dragon owners need to know about the latest developments for their micro.

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Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, Dragon User, 12-13 Little Newport Street, London WC2H 7PP.

Soundbox

RE "Soundbox" program by Pam Gikley in Dragon User, April 1988.

I own a Dragon 64 and find that the above program will operate on the machine when it is in 32 mode but not in 64 mode. This is apparently because the program calls up a routine at \$DD4H which is relocated when the machine is in 64 mode.

As I wish to use the program in 64 mode, could you possibly tell me which address to substitute for \$DD4H? I should be most grateful.

While writing, may I ask for your assistance on another Dragon program that I am having problems with? I refer to Knight Software's Sorite Magic, which I purchased some months ago but have only now started using.

According to the manual accompanying the program, drawing data is stored between \$4000 and \$40FFH (assuming "standard 200, \$4000"), giving over three K of memory for drawing data.

I am developing a program in PMODE 3 and find that Sorite Magic will not cope with the drawings of 70 bytes each (no-coordinates \$0-\$0.23 in normal "non-Sorite Magic" terminology). As soon as I try to draw the 8th drawing, the program reports "ERR3 \$0040H" and all drawing space has been used up.

I have tried to contact Knight Software by telephone but can only get "number unobtainable".

D Swift
41 Headington Road
Miltonhead
Oxford OX4 4A

CAN anybody help Mr Swift with his Sorite Magic problem?

Beginners?

I AM the contented owner of a Dragon 32 and purchase Dragon User regularly.

I find the articles rather confusing for a beginner — it is really necessary to publish pages and pages of complicated programs? Do people really put them into their computers?

I would like to support a section for beginners, with

really short programs for them to try.

I am a glot that you are trying the Dragon flag — it is a splendid machine — but Dragon User is far too complicated, in my opinion.

G R Gofiele
83 Woodbrook Road
Sedmouth EX12 9XD

Windows

CAN Phil Brooks provide us with the Source Code of the Window program? I have found out that to prevent errors never to put a REM after an input question, but these are only ripples in the big Redesigner program.

Further I found out some fantastic effects in the program, let us have here a sample.

```
1 PMODE 3.1:PCLE:
SCREEN1.1
2 WRITE@SSL,"DEMO At
  Chess":
3 FOR DELAY=1 TO 5000:
NEXT DELAY
4 FOR CHARS=0 TO 100
5 FOR LOCATION=100 TO 1000
6 ALPHA=CHARS*(M/WRITE
  @ (LOCATION),ALPHA)
7 NEXT LOCATION
8 NEXT CHARS
```

A Van Mommie
Dragon Users Club
Netherlands — Belgium
J Jmmommie
Dedden 6330
Belgium

smashing!

IF ANY readers have not yet tried Brian Cadge's Windows program from July's issue, or thought the prospect of typing all those data statements a bit of a pain (sic), then I would ask them to reflect on their decision. Have a crack at it, it will throw a new light on your Dragon. I really say — **smash!**

By using WINDOW 8.8.31, 9.15.1 all printing to the screen is white on black — far less tiring on the old mice plus than the standard black on white, especially if, like me, you're a bit long in the tooth (over 30).

Also, by using several screens at once, the computer will give the illusion of carrying out different functions simultaneously.

I have written a program

which decides the screen into four — all doing different things.

Screen one displays a timer or clock, screen two runs through the GPRs repertoire of the computer, screen three prints a conversion of decimal to hexadecimal values and screen four displays random random number up to 999 using the random function. The RND function in line 100 is to add to the illusion that the screen is performing simultaneous functions.

David Moore
Rilhampton
Bide
Cornwall EX23 9DA

Delightful!

I AM delighted with the past few issues (May through August) of Dragon User. You finally admitted that Dragon DCS exists, and that you have some readers who are sick of games and want to use those powerful (and in Israel — expensive) machines for serious purposes. Please, let more of Dragon DCS, OS9, Delta DCS, and FLEX.

My thanks to Pam Gikley for her excellent introduction ("The Numbers Game", June 1988), it was perfectly the first time. She is a meticulous programmer and excellent writer.

Line-by-line checkouts are used in US magazines for program listings. Regular use of such a system, plus better editing, would reduce the number of unworkable listings you print.

A friend with a Dragon 32 and tape typed in "MOON MINER". Pam beautifully the first time. Of course, it doesn't run on my 64 with DCS plugged in. Please, tell me the changes necessary in the machine code to run it with Dragon DCS attached. My tape recorder broke down last year, never bothered to repair it after I bought a disk system.

It would be a big boost to your potential circulation if you gave program listings with versions for tape, Dragon DCS, Delta DCS, and FLEX. Some OS9 programs would also be good for those of us who spent so much on serious software to use the capabilities of the Dragon computer. You can have a wider circulation by

offering more, especially to those who have disk systems and the high-priced software.

Harry G Taylor II
Rincon
Israel

OS9

I HAVE owned Dragons right from the beginning when Dragon Data first got going.

Right back in the early days, I had a small routine published in one of the interior wastepaper, for indeed tape loading. The offending publishers never actually paid me for this, despite a couple of letters to remind them. I vowed after this, on principle, not to write to a magazine again. However the time has now come to break my silence.

Over the past years, I have had great satisfaction from computing with Dragons, having written many disk loads of software, built up my programme to a, and I am now towards, real time clocks etc. If you look at other computers, you will see that there are some excellent user groups abroad, but nothing for Dragon users. Take OS9, there is a wealth of software for machines running such, but not OS9. I think we should change this. I would be glad to hear from anyone who is interested in this, and if there is sufficient response, we should be able to get a US group.

Does anyone know where and how the clock module is linked into OS9, as I know there is provision for a real-time clock? Does anybody know if there is a suitable modern package on the market (I am sure this will cost less than a home brew)? Also does anyone know of a good communications package for serial links? Finally, I have just spent a lot of time converting 32 disk software by putting an axis on the 32 and transferring the program serially to an OS9 text file where it can be modified with stygraph and compiled by MassDB. If anyone wants to drop me a line they will be very welcome (I would appreciate a return stamp) and I will give them further details.

Mark Vernon
4 Roseberry Court
Llandudno
Gwynedd LL50 1TF

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Dragon claws BBC B

THE DRAGON's Claw is a new digital interface for the Dragon, which enables it to control peripherals designed for the BBC B.

Fitting into a standard cartridge box, the Claw, designed by Lucidate of Cambridge, includes two full specification eight bit ports, internal timer and serial to parallel converter. It also replicates the Dragon's expansion slot connector, which means that other peripherals can be connected to the micro at the same time — games

cartridges, disk controllers, or address assemblies.

More than one Claw can be used at once — up to four can be stacked up, all with separate addresses.

The Claw is compatible with Flex, Dragon Dos and others.

Lucidate is also offering the Micro Robotics Snap camera, which lets users digitise photos, store them or play around with them to produce some very interesting effects, under the name Snap Dragon.

Many other BBC B peripherals will be converted to Dragon use in the future, including a three axis Robot Arm. Lucidate will be demonstrating the Claw, Snap Dragon, and other developments at the Fair 8889 Show in November.

The Dragon's Claw costs £30 and the Snap costs £130, excluding VAT and postage and packing. Both are available, mail order only, from Lucidate, PO Box 128, Cambridge CB2 3EZ.

Sprites and Demons

J MORRISON (Micro) of Tingley, West Yorkshire, has two new products in cartridge for the Dragon.

The first is an Animated Sprite Generator Scenario Generator. There are some 40 or 50 different commands, which enable the user to create 50 distinct types of sprites. There are facilities to change direction and movement of sprites, and even to change looks when the sprite collides with another object — so that a monster could change shape when shot, for example.

The other product is a Demon Development Cartridge. It is an editor/ assembler, monitor and disassembler, with 17 commands on the monitor side and 15 on the assembler.

Each cartridge utilizes cost £100, each from J Morrison (Micro), 4 Horn Gardens, Tingley, West Yorkshire WF3 1JF.

and would be ready in time for Christmas. "It's expensive to develop," he said, "so we need some money right now."

Impsoft is at 189 Bathurst Hill, London SW12 8DZ.

Cumana in Spain

CUBANA, the disk drive manufacturers, has appointed a distributor to take advantage of the growing market for Dragon peripherals in Spain.

CAT España, a company specialising in the export and import of high technology equipment, will act as Cumana's agent within Spain.

Eurocard, the Spanish company which now makes the Dragon, is attempting to promote it — as the Dragon 2000 — as the perfect mini for schools, in the same way as the BBC B was adopted by British educational establishments.

To use Cumana disk drives, Dragon owners need a disk



controller, which operates under Cumana DOS, a Dragon compatible operating system built into ROM.

The disk drives themselves come in a wide variety of types. Users can opt for 40 or 80 track, double or single sided 5 1/4 in or 3 1/2 in disks.

Cumana is at Pines Trading Estate, Broad Street, Duffield, Surrey GU23 2BH.

Impish

IMPSOFT has reduced the price of *Chetkin Run and Fruity* to £2.95 each and £4.95 for the pair.

Norman Silver, Impsoft's managing director, claimed that the reductions are being made to clear out stock levels "prior to Impsoft's new Dragon releases in the autumn". However, he was unwilling to say what those new releases were.

He did state that the new products would combine software and hardware,

Compuchat

COMPUSOFT is to release a communications program, called Chat, and a complete communications package for the Dragon which will enable users to connect bulletin boards, Prestel, Telecom Gold and a new service, One-To-One.

The software for Chat will cost £5.95, and Compuchat deal — modems,



modem cables and Chat — for £89.

In addition, Chat can also be used to turn a Dragon 64 into a terminal, working at up to 19,200 baud rate.

Chat comes on cassette, or it can be supplied for Dragon DOS, Cumana DOS, Data DOS or Flex with Basic.

One-To-One is a new electronic messaging system which Compuchat is supporting. It offers a wide variety of facilities, including instant mail, priority and courier letters, radio paging and a worldwide Telex service.

Contact Compuchat for more information on Chat and One-To-One at PO Box 189, 2880 Green Lane, London N12 5SA.

Wintersoft return

WINTERSOFT, the company which published the classic Dragon games *The Ring of Darkness* and *Return of the Ring*, is working on a new graphical adventure but spokesman John Humphreys said very definitely "it's not part three of the Ring cycle."

The new game is called *Axaposition*, and is really two games in one. In the first, which has a science fiction setting, the player is searching for the key word which will allow passage into the second game, which has a fantasy plotline.

"The graphics will be

similar to those used on *Baywatch*. Lots of M&E right," said John. "In each location, you will be able to look in eight directions, and you will see a coherent landscape."

There will be 4,000 locations in each game, which makes a total of 84,000 views. Over 2,500 of the locations will be described at length in text.

Axaposition is scheduled for release at the end of September, and will probably cost £6.95.

Contact Wintersoft at 30 Uplands Park Road, Enfield, Middlesex EN2 7PT.

Basic Basic for your Dragon

*Idol ap Gwyn has some basic advice for beginners
on how to tidy up your listings*

MUCH HAS been said and written about the strengths and weaknesses of the Dragon. One of its strengths is its ease of programming, with a particularly powerful version of BASIC. In addition it has, arguably, the most of all 8-bit microprocessors to program in assembly language, the Motorola 6809. This makes it a very good machine for people to learn the principles of programming on. The BASIC, incidentally, is very similar to that used on the IBM PC and the Amstrad.

However, when writing programs in BASIC it is possible to get into a terrible tangle and produce what is known in the trade as "spaghetti" programming. This is one of the reasons why many computer science purists regard it with some disgust, and even suggest that children should not learn how to use it as its use would create bad habits. The fact remains that it is still one of the most popular of the high level programming languages and is invariably the first to be supplied with any new micro.

*"First attempts
tend to run
rather slowly"*

When a microcomputer like the Dragon is working in BASIC through its own BASIC interpreter, most people's first attempts at programming tend to result in games that run rather slowly. This can be a very frustrating experience if you have spent quite some time planning and writing your program.

One approach to speeding matters up is to use a BASIC compiler, which converts your BASIC program, which must have been completely debugged, into a machine code program. This is then saved as a machine code program and can be subsequently loaded and run as a machine code program. This speeds up

the action by a factor of as much as 10 or more, because the microprocessor in the computer acts directly upon the machine code instructions as this is the only language it understands. No time consuming intermediate stages are involved.

The reason for the difference in speed is that when a BASIC program is being run through the interpreter, which is held in the permanent ROM of the computer, each time an instruction is called the computer has to search through the interpreter for the machine code routine to carry out that instruction. But this is not necessary when the BASIC instruction has already been converted into machine-code by a compiler before the program is run. For this, and many other reasons, compiled programs run much faster.

Careful planning and writing of the program makes possible a significant speeding up of the original BASIC program without the need for a compiler. Not that this approaches the speed of a compiled program, but very often it adds just that extra speed which can make the difference between the program being usable or not. A well-organised program will also run even faster if it is compiled. In addition the practices it encourages lead to easier programming, and the use of parts of programs as a basis for other future programs, thereby saving you a deal of unnecessary programming. This is the way that the professional programmer works, having a library of subroutines to draw upon.

The first thing we must do is to plan the program very carefully into modules or subroutines. The main program then makes use of the subroutines when needed. The best place to put these is at the beginning of the program, the most commonly used ones coming first. This means that whenever the GOTO/BG instruction is given the program only has to run through a few program lines to find the called line number.

Such "structured" programming is always good practice. It is much easier to follow the program in the event of any "bugs" appearing, and adjust variables and other values in order to get the program to do exactly what you require. Also once you have written a routine to do a particular task in one program it could

then easily be used in another program should you wish the same kind of task performed again. It is also much more efficient in the use of computer memory, as a well-written program can be as much as half as long as a non-structured example. An added benefit to this approach is that it may be much easier to modify the program to run in different versions of BASIC, should you wish to transfer it to another type of computer.

*"Careful planning
adds
extra speed"*

In order that I can demonstrate exactly what this means, let us look at an example. These examples of a short program to draw a few circles are given. All of them do the same job, but in a fundamentally different way.

Example 1 — A non-structured program

```
10 P=MODE4,1:SCREEN,1:PCLS
20 CIRCLE(128,65),20
30 CIRCLE(128,65),40
40 CIRCLE(128,65),60
50 CIRCLE(128,65),80
60 GOTO 60
```

Example 2 — A structured approach to the same task

```
10 P=MODE4,1: SCREEN,1: PCLS:
GOTO 30
20 CIRCLE(128,65),R:RETURN
30 R=20:GOTO 5:20
40 R=40:GOTO 5:20
50 R=60:GOTO 5:20
60 R=80:GOTO 5:20
70 GOTO 70
```

Example 3 — An even better approach

```
10 P=MODE4,1: SCREEN,1: PCLS:
GOTO 30
20 CIRCLE(X,Y),R:RETURN
30 X=128:Y=65
40 FOR R=20 TO 80 STEP 20
50 GOSUB 20
60 NEXT R
70 GOTO 70
```

In line 20 there now exists a subroutine

to draw a circle at any time one is needed without having to enter the whole instruction at each point in the program. All that has to be done is to set the values for the variables, and call the subroutine. This is a very simple example, but it demonstrates the principle behind this approach to doing things.

In some other high level languages, such as PASCAL, you are forced to work in such a manner. This is why many people favour its use. Similar techniques are also required for successful Assembly language programming. The approach used is therefore to prepare subroutines to do various tasks required in the program, and then to call them when they are needed from the main program. Careful planning usually means that certain commands are only entered a few times in a whole program, whereas the GOSUB command occurs over time.

In some versions of BASIC, such as BBC BASIC, there is also the PROCEDURE which does a similar job, and makes structured programming even easier, because each subroutine or procedure can be given a name instead of a line number. Structuring will lead to faster, shorter programs, but by far the greatest speeding up is achieved by being careful in the way one is made of certain commands.

By measuring the time the computer takes to complete various tasks it is possible to find out the most efficient approach to writing code. With the Dragon it is possible to experiment in order to find out how long it takes to perform tasks by using the TIMER command.

One method of speeding things up considerably is by using IF THEN ELSE, conditional statements. If variables, which have been preset, are used instead of constants then we obtain a dramatic increase in the speed of the program. This increase is as much as achieved by using the notorious "high speed FOR" which appeared to work quite well on some machines, particularly those of an earlier vintage! The reason for this is that each time the interpreter meets a constant it has to calculate its value and place it in the appropriate register. However, a variable which has already been set only requires the interpreter to look up the register to find the required value. This latter process takes up far less cycles of the micro-processor operation and hence is much faster. This is one of the reasons why structured programming works later — you are forced to use variables instead of constants.

Take the following simple example to illustrate the point:

```
10 TIMER=0
20 FOR I=1 TO 10000
30 IF I=10000 THEN PRINT TIMER:
END
40 NEXT
```

Running this program on my Dragon gives a TIMER value of 4472. Modifying this short program in the following manner reduces this value to 2243, virtually a halving of the time taken!

```
10 MAX=10000
```

```
10 TIMER=0
20 FOR I=1 TO 10000
30 IF I=MAX THEN PRINT TIMER: END
40 NEXT
```

A further speeding up can be achieved by substitution of the 10000 in line 20 by MAX as well, but not such a dramatic saving as with the IF THEN statement. Similar small savings can be made in most commands, especially graphics ones. The amount saved can vary between 5 and 25 per cent per command.

"Structuring will lead to faster, shorter programs"

The following example shows how some speeding up of the LINE command can be achieved in this way:

```
10 PLOT004,1:SCREEN,1,POLY
20 TIMER=0
30 FOR I=1 TO 100
40 LINE(0,0) - (200,100)
50 NEXT
60 PRINT "TIME=" ;TIMER
```

```
(TIME=767)
Edit:
5 2=0-Y=85.0=255
40 LINE(2-Y) - (X,UPSET)
```

(TIME=709)
If the program allows it, an appreciable amount of time can be saved when using FOR — NEXT loops by leaving the variable out of the NEXT statement. For example, instead of writing FOR I=0 TO 10000 NEXT I, we substitute FOR I=0 TO 10000 NEXT. This must be done carefully, especially if you jump into subroutines which themselves contain other FOR — NEXT loops. If this occurs things can get ever so complicated and you will probably need to use the TRON tracing facility to sort out exactly what is happening!

One useful piece of information which can save a lot of programming time, and as far as I know has not been documented for the Dragon is that the MID\$ command can be used in two ways. This is part of its standard MICROSOFT function, but seems to have been left out of the Dragon documentation. The standard use of MID\$, as documented, is in asking a question of a part of a string such as in IF MID\$(STRING\$.3,3)="BOX" THEN and so on. It can, however, be used the other way around, like MID\$(STRING\$.3,3)="BOX", so that new substrings can be assigned to the middle of larger strings. These strings must, however, exist, as this instruction cannot create a new string by itself.

There is another way of obtaining an IF — THEN variation, other than the conventional way. Where the result of the conditional statement affects an arithmetic calculation it is possible to dispense with the IF and as so. This is done by virtue of the fact that the computer assigns a value to a statement such as A=B or A=C. If the condition is true then it registers as -1, if

false then as a 0. The following example will serve to illustrate:

```
Normal approach
10 IF A=B THEN A=B+100
20 IF A=C THEN A=C+1000
30 A=A+B+C
```

```
Alternative approach
10 A = -1+100*(A=B)+1000*(A=C)+B+C
```

The whole process is accomplished in a single statement. If you wish to work it out for yourself just take each part of the statement at a time and think about exactly what is happening, remembering that true gives -1, false 0 and what happens when you multiply by 0 or multiply two negative numbers together.

Once the program has been written and debugged, it is then possible to speed things up, as well as save on memory, by removing REMs and forming multi-statement lines. This also makes it dreadfully difficult for anyone else to work out how your program works, but remember to keep an unedited version for your own future reference!

Although the sensible use of REMs is essential in a good program, so that as many humans can follow what is going on, once the program is running and does not need further editing then they can be removed. This exercise must be done very carefully because any lines containing directions to GOSUB or GOTO line numbers must have a line number to jump to. Having access to a word processor, such as the Dragon Supereditor or the Teletexter makes light work of this job. Searching facilities can be used to check the line numbers associated with GOTO or GOSUB commands.

In Simon, the demonstration program which follows many of the suggested practices have been incorporated. You may wish to experiment by changing it yourself, so the final stripping of REMs and compression of lines has not been done. The program, called SIMON after the popular game, also makes use of the very useful PCOPY command, which as far as I can tell is unique to the Dragon and TRS80 BASIC. It enables the programmer to switch between any of the eight high resolution graphics screens.

If, as is done in this program, they are set up beforehand the display that they contain can be switched instantly on to the screen when needed.

Speeding up of the setting up of the graphics pages was achieved by placing all of the constants and strings in DATA statements at the end of the program. All of the subroutines are set out in lines 70 to 750. This game is all run between lines 760 and 800.

It is quite easy to follow what is going on in this program because of the way it is laid out.

So, by following fairly simple rules it is possible to write more satisfactory programs and spend much less time debugging "bugghetti", which need yards of paper to print them out on. As with using any type of language, be it human or computer, there is much more to it than simply learning the meanings of words.

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```

10: CLEARQ00:PCLEAR
20: CLS:PRINT@=00000;"Simon"
30: PRINT:PRINT:PRINT"333-New Little Computer 1"
40: PRINT:PRINT"By D. ap. Baynes, 2/88"
50: B0TCH00
60: "
70: " SUBROUTINES
80: "
90: "PRINT LINE SUB
100: FOR I=1 TO 200:LINE
110: DRAW"BP"+STR$(I)+", "+STR$(I)+",B"+STR$(I)+AR:ASC(1000:LINE, I, 100-200)
120: B=0:000
130: NEXT:I:RETURN
140: "
150: "DRAW BORDER SUB
160: LINE(1, 1)-(200-1, 99-1),PSET,B
170: LINE(1, 1+99)-(200-1, 191-1),PSET,B
180: RETURN
190: "
200: "DELAY SUB
210: FOR I=0 TO 20000:NEXT:I: RETURN
220: "
230: "CORRECT ANSWER SUB
240: FOR I=1 TO 10:FOR J=1 TO 10:FOR K=1 TO 10:FOR L=1 TO 10:NEXT
250: SOUND10
260: PCOPYST00:PCOPYST00:PCOPYST00:PCOPYST00
270: RETURN
280: "
290: "INCORRECT ANSWER SUB
300: LINE(0, 0)-(200, 99),PSET,BP
310: B=0:Y=200:B=0:000:J=1:LINE"INCORRECT!" :SOUND00
320: B=0:Y=99:J=0:"Start again!" :SOUND100
330: B=0:Y=99:J=0:"Score=" +STR$(LEN(ANS)-1):SOUND100
340: FOR I=0 TO 20: SOUND(0, 1):SOUND(0, 1):NEXT I
350: SOUND10
360: PCOPYST00:PCOPYST00:PCOPYST00:PCOPYST00
370: B=0:"":RETURN
380: "
390: "COMPLETE SET SUB
400: SCREEN0, 1:CLS:PRINT@=00000;"TWO THOUSANT CORRECT!" :SOUND 200
410: FOR I=1024 TO 5120:FOR J=1, 200: SOUND@=2000, 1:NEXT J
420: PCOPYST00:PCOPYST00:PCOPYST00:PCOPYST00
430: B=0:"":RETURN
440: "
450: "END OF SUBROUTINES
460: "
470: B=0:"":ANS=""
480: DIM AN1PO1
490: "SET UP CHARACTER STRING ARRAYS
500: FOR I=1 TO 43: READ H,AN(I): NEXT
510: "SET UP CORRECT ANSWER ARRAY
520: READ MP1 SIN PO1MP, 21
530: FOR I=1 TO 10: READ PO1, 01, PO12, 11: NEXT
540: "
550: "SET UP GRAPHICS PAGES
560: "
570: J=40:FOR I=1 TO 4
580: PDE01, 1: POL00:COL000
590: DRAW"1000, 000000"+AR:ASC(0000:STR$(I), 2, 100-200)
600: J=J-1
610: NEXT
620: "
630: "PREP INTR
640: PDE01, 01:POL00:COL000, 3
650: FOR I=0 TO 10: SOUND100: NEXT
660: B=200:Y=PO10:B=200:000:J=1:LINE"READY!" :SOUND00
670: B=200:Y=100:B=0:000:J=1:LINE"Simon says...." : SOUND100
680: B=200:Y=100:J=1:LINE"Look & Listen!" : SOUND000

```

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```

7000 PROBLE1,1,1,POLYCOL,COLOR,3
7001 FOR1=1 TO 1000: DO:CALL1: NEXT
7100 X=X+1:Y=Y+1:Z=Z+1:W=W+1:V=V+1:U=U+1:T=T+1:S=S+1:R=R+1:Q=Q+1:P=P+1:O=O+1:N=N+1:M=M+1:L=L+1:K=K+1:J=J+1:I=I+1:H=H+1:G=G+1:F=F+1:E=E+1:D=D+1:C=C+1:B=B+1:A=A+1
7200 W=1:V=2:U=3:T=4:S=5:R=6:Q=7:P=8:O=9:N=10:M=11:L=12:K=13:J=14:I=15:H=16:G=17:F=18:E=19:D=20:C=21:B=22:A=23
7300 '
7400 '
7500 '
7600 PROBLE1,1,1,SCREEN1,0
7700 SCREEN1
7800 PCOPY=0
7900 FOR1=1 TO 1000: DO:CALL1: NEXT
8000 FOR1=1 TO 1000: DO:CALL1: NEXT
8100 PCOPY=VAL(1000/1000,1,1):T=0
8200 SCREEN=VAL(1000/1000,1,1):S=0:Z=0:LEN(1000)
8300 NEXT
8400 PCOPY=0:PCOPY=1:PCOPY=2:PCOPY=3:PCOPY=4:PCOPY=5:PCOPY=6:PCOPY=7:PCOPY=8:PCOPY=9:PCOPY=10:PCOPY=11:PCOPY=12:PCOPY=13:PCOPY=14:PCOPY=15:PCOPY=16:PCOPY=17:PCOPY=18:PCOPY=19:PCOPY=20:PCOPY=21:PCOPY=22:PCOPY=23:PCOPY=24:PCOPY=25:PCOPY=26:PCOPY=27:PCOPY=28:PCOPY=29:PCOPY=30:PCOPY=31:PCOPY=32:PCOPY=33:PCOPY=34:PCOPY=35:PCOPY=36:PCOPY=37:PCOPY=38:PCOPY=39:PCOPY=40:PCOPY=41:PCOPY=42:PCOPY=43:PCOPY=44:PCOPY=45:PCOPY=46:PCOPY=47:PCOPY=48:PCOPY=49:PCOPY=50:PCOPY=51:PCOPY=52:PCOPY=53:PCOPY=54:PCOPY=55:PCOPY=56:PCOPY=57:PCOPY=58:PCOPY=59:PCOPY=60:PCOPY=61:PCOPY=62:PCOPY=63:PCOPY=64:PCOPY=65:PCOPY=66:PCOPY=67:PCOPY=68:PCOPY=69:PCOPY=70:PCOPY=71:PCOPY=72:PCOPY=73:PCOPY=74:PCOPY=75:PCOPY=76:PCOPY=77:PCOPY=78:PCOPY=79:PCOPY=80:PCOPY=81:PCOPY=82:PCOPY=83:PCOPY=84:PCOPY=85:PCOPY=86:PCOPY=87:PCOPY=88:PCOPY=89:PCOPY=90:PCOPY=91:PCOPY=92:PCOPY=93:PCOPY=94:PCOPY=95:PCOPY=96:PCOPY=97:PCOPY=98:PCOPY=99:PCOPY=100:PCOPY=101:PCOPY=102:PCOPY=103:PCOPY=104:PCOPY=105:PCOPY=106:PCOPY=107:PCOPY=108:PCOPY=109:PCOPY=110:PCOPY=111:PCOPY=112:PCOPY=113:PCOPY=114:PCOPY=115:PCOPY=116:PCOPY=117:PCOPY=118:PCOPY=119:PCOPY=120:PCOPY=121:PCOPY=122:PCOPY=123:PCOPY=124:PCOPY=125:PCOPY=126:PCOPY=127:PCOPY=128:PCOPY=129:PCOPY=130:PCOPY=131:PCOPY=132:PCOPY=133:PCOPY=134:PCOPY=135:PCOPY=136:PCOPY=137:PCOPY=138:PCOPY=139:PCOPY=140:PCOPY=141:PCOPY=142:PCOPY=143:PCOPY=144:PCOPY=145:PCOPY=146:PCOPY=147:PCOPY=148:PCOPY=149:PCOPY=150:PCOPY=151:PCOPY=152:PCOPY=153:PCOPY=154:PCOPY=155:PCOPY=156:PCOPY=157:PCOPY=158:PCOPY=159:PCOPY=160:PCOPY=161:PCOPY=162:PCOPY=163:PCOPY=164:PCOPY=165:PCOPY=166:PCOPY=167:PCOPY=168:PCOPY=169:PCOPY=170:PCOPY=171:PCOPY=172:PCOPY=173:PCOPY=174:PCOPY=175:PCOPY=176:PCOPY=177:PCOPY=178:PCOPY=179:PCOPY=180:PCOPY=181:PCOPY=182:PCOPY=183:PCOPY=184:PCOPY=185:PCOPY=186:PCOPY=187:PCOPY=188:PCOPY=189:PCOPY=190:PCOPY=191:PCOPY=192:PCOPY=193:PCOPY=194:PCOPY=195:PCOPY=196:PCOPY=197:PCOPY=198:PCOPY=199:PCOPY=200:PCOPY=201:PCOPY=202:PCOPY=203:PCOPY=204:PCOPY=205:PCOPY=206:PCOPY=207:PCOPY=208:PCOPY=209:PCOPY=210:PCOPY=211:PCOPY=212:PCOPY=213:PCOPY=214:PCOPY=215:PCOPY=216:PCOPY=217:PCOPY=218:PCOPY=219:PCOPY=220:PCOPY=221:PCOPY=222:PCOPY=223:PCOPY=224:PCOPY=225:PCOPY=226:PCOPY=227:PCOPY=228:PCOPY=229:PCOPY=230:PCOPY=231:PCOPY=232:PCOPY=233:PCOPY=234:PCOPY=235:PCOPY=236:PCOPY=237:PCOPY=238:PCOPY=239:PCOPY=240:PCOPY=241:PCOPY=242:PCOPY=243:PCOPY=244:PCOPY=245:PCOPY=246:PCOPY=247:PCOPY=248:PCOPY=249:PCOPY=250:PCOPY=251:PCOPY=252:PCOPY=253:PCOPY=254:PCOPY=255:PCOPY=256:PCOPY=257:PCOPY=258:PCOPY=259:PCOPY=260:PCOPY=261:PCOPY=262:PCOPY=263:PCOPY=264:PCOPY=265:PCOPY=266:PCOPY=267:PCOPY=268:PCOPY=269:PCOPY=270:PCOPY=271:PCOPY=272:PCOPY=273:PCOPY=274:PCOPY=275:PCOPY=276:PCOPY=277:PCOPY=278:PCOPY=279:PCOPY=280:PCOPY=281:PCOPY=282:PCOPY=283:PCOPY=284:PCOPY=285:PCOPY=286:PCOPY=287:PCOPY=288:PCOPY=289:PCOPY=290:PCOPY=291:PCOPY=292:PCOPY=293:PCOPY=294:PCOPY=295:PCOPY=296:PCOPY=297:PCOPY=298:PCOPY=299:PCOPY=300:PCOPY=301:PCOPY=302:PCOPY=303:PCOPY=304:PCOPY=305:PCOPY=306:PCOPY=307:PCOPY=308:PCOPY=309:PCOPY=310:PCOPY=311:PCOPY=312:PCOPY=313:PCOPY=314:PCOPY=315:PCOPY=316:PCOPY=317:PCOPY=318:PCOPY=319:PCOPY=320:PCOPY=321:PCOPY=322:PCOPY=323:PCOPY=324:PCOPY=325:PCOPY=326:PCOPY=327:PCOPY=328:PCOPY=329:PCOPY=330:PCOPY=331:PCOPY=332:PCOPY=333:PCOPY=334:PCOPY=335:PCOPY=336:PCOPY=337:PCOPY=338:PCOPY=339:PCOPY=340:PCOPY=341:PCOPY=342:PCOPY=343:PCOPY=344:PCOPY=345:PCOPY=346:PCOPY=347:PCOPY=348:PCOPY=349:PCOPY=350:PCOPY=351:PCOPY=352:PCOPY=353:PCOPY=354:PCOPY=355:PCOPY=356:PCOPY=357:PCOPY=358:PCOPY=359:PCOPY=360:PCOPY=361:PCOPY=362:PCOPY=363:PCOPY=364:PCOPY=365:PCOPY=366:PCOPY=367:PCOPY=368:PCOPY=369:PCOPY=370:PCOPY=371:PCOPY=372:PCOPY=373:PCOPY=374:PCOPY=375:PCOPY=376:PCOPY=377:PCOPY=378:PCOPY=379:PCOPY=380:PCOPY=381:PCOPY=382:PCOPY=383:PCOPY=384:PCOPY=385:PCOPY=386:PCOPY=387:PCOPY=388:PCOPY=389:PCOPY=390:PCOPY=391:PCOPY=392:PCOPY=393:PCOPY=394:PCOPY=395:PCOPY=396:PCOPY=397:PCOPY=398:PCOPY=399:PCOPY=400:PCOPY=401:PCOPY=402:PCOPY=403:PCOPY=404:PCOPY=405:PCOPY=406:PCOPY=407:PCOPY=408:PCOPY=409:PCOPY=410:PCOPY=411:PCOPY=412:PCOPY=413:PCOPY=414:PCOPY=415:PCOPY=416:PCOPY=417:PCOPY=418:PCOPY=419:PCOPY=420:PCOPY=421:PCOPY=422:PCOPY=423:PCOPY=424:PCOPY=425:PCOPY=426:PCOPY=427:PCOPY=428:PCOPY=429:PCOPY=430:PCOPY=431:PCOPY=432:PCOPY=433:PCOPY=434:PCOPY=435:PCOPY=436:PCOPY=437:PCOPY=438:PCOPY=439:PCOPY=440:PCOPY=441:PCOPY=442:PCOPY=443:PCOPY=444:PCOPY=445:PCOPY=446:PCOPY=447:PCOPY=448:PCOPY=449:PCOPY=450:PCOPY=451:PCOPY=452:PCOPY=453:PCOPY=454:PCOPY=455:PCOPY=456:PCOPY=457:PCOPY=458:PCOPY=459:PCOPY=460:PCOPY=461:PCOPY=462:PCOPY=463:PCOPY=464:PCOPY=465:PCOPY=466:PCOPY=467:PCOPY=468:PCOPY=469:PCOPY=470:PCOPY=471:PCOPY=472:PCOPY=473:PCOPY=474:PCOPY=475:PCOPY=476:PCOPY=477:PCOPY=478:PCOPY=479:PCOPY=480:PCOPY=481:PCOPY=482:PCOPY=483:PCOPY=484:PCOPY=485:PCOPY=486:PCOPY=487:PCOPY=488:PCOPY=489:PCOPY=490:PCOPY=491:PCOPY=492:PCOPY=493:PCOPY=494:PCOPY=495:PCOPY=496:PCOPY=497:PCOPY=498:PCOPY=499:PCOPY=500:PCOPY=501:PCOPY=502:PCOPY=503:PCOPY=504:PCOPY=505:PCOPY=506:PCOPY=507:PCOPY=508:PCOPY=509:PCOPY=510: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Popular Computing Weekly, Dec. 1985



Zippy titles!

Brian Hinson shows you how to add some zip to your programs with a routine which designs text screens

You may well have written a brilliant program that you, and maybe your family, have great fun with. What happens when a stranger comes to have a go? Can he understand it? Is he attracted to it even while it is still loading in from tape?

Well, I have developed two simple utilities. One allows you to create text screens direct from the keyboard using all 256 possible characters. The other provides a snappy display of text for use as instructions or information. To see all 256 ASCII characters try this:-

```
10 CLS
20 FOR A=0 TO 255
30 PRINT 1904+A,A
40 NEXT A
50 GOTO 30
```

If you have already used my Artist program, published in *Dragon User*, April 1985, to create machine code listings for your graphic screens you may like to consider this idea. Record the following simple Basic program at the beginning of a new tape, followed by a machine code file page, then the graphics produced with Artist. Right after that, record a second file page and then your main program.

```
10 CLOADM "TITLE 1"
20 CLOADM "GRAPHICS"
30 CLOADM "TITLE 2"
40 CLOAD "MAIN PROG"
```

Rewind the tape and type <CLOAD>. Very shortly the <CR> prompt will appear. Now <RUN> and instead of the standard boring green screen with flashing "F", you produce a full colour introduction screen while the computer quietly loads in the graphics. Next a new instruction screen appears before the main Basic program loads.

The listing below will allow you to make machine code recordings of text screens in full line colour graphic blocks plus all

ASCII characters direct from the Dragon keyboard.

My way of explanation of the program and also to illustrate a way of producing multiple text displays for complex utility instructions or educational programs, I have included my Flashy instructions routine from line 1840 to line 1110.

The text screen is cleared to black and the number of lines to be displayed (maximum 18), is read in from data. C\$ and C% are for decoration, and if used count as one line each. (They produce black and orange lines respectively in screen 0,1). The cost of this routine is 11 lines 990 to 995. Each line of data is read, and spaces are added to each end until the text fits centrally. By switching to screen 1, if rather a pleasant effect is obtained. The program then waits at line 990 until the "user" is ready.

If you want to save this subroutine separately DELETE the lines up to and including 950. DELETE lines 1020 onwards and substitute:

```
1020 " DATA LINES SHOULD START
1030 " WITH A NUMBER (MAX 18)
1040 " C$=BLACK C%-ORANGE LINE
1050 " MAX LINE LENGTH=32
```

This will remind you how to fit it up when you want to use it again.

The main "Zippy Title" program really starts at line 90 but note line 60 where the number of pages of script in the "Flashy instruction" routine is set to 5. (AA=0 to 4. NOTE: in a different program you may well want the pages to come up after parts of the program have run through: just insert GOTO 950--- when the next page is required. Having set the background as required, your keyboard is like a normal typewriter in that each key produces "lower case" letters unless <shift> is pressed for "upper case". You will have a normal cursor at this stage and you can move it around the screen by use of the arrow

keys, without disturbing anything.

At this stage it is not possible to obtain the reverse for the shifted characters like "+", or the "normal" numbers, but these are available. Let's deal with normal graphics blocks first. Graphics are obtained by pressing <shift> and <0> together (the shift-lock). The cursor will change to green. Now the letters A-P will give you green blocks from solid black to solid green (see the chart below). Press "Z" and you advance through the colours one by one. At each stage the full 16 blocks are available and the cursor will blink in the appropriate colour. See the chart at the foot of the page.

If you press "Z" when your cursor is orange you will move into the "double reverse mode". Now the following relationship is active and these keys all print inverse characters:

```
A = 90 BPRINT OPEN   B = REV/
C = 90 BPRINT CLOSE  D = UP ARROW
E = LEFT ARROW
```

```
G = I   H = J   I = E   J = S   K = %
L = &   M = ^   N = (   O = )   P = ~
Q = +   S = <   T = >   U = V   V = ?
R = The record to tape routine is activated.
```

These keys all print normal characters:

```
B = 0
I = 90 BPRINT OPEN   I = REV/
Z = 90 BPRINT CLOSE  S = UP ARROW
% = LEFT ARROW
```

All the number keys and the lower alpha keys like "a" produce their respective "normal" characters.

The cursor in this mode is a reverse high sign which my printer will show as "T", a pound sign. (Make this in line 1840). At any time you may return to normal type by cancelling the "shift-lock", (press <right> and <0> together).

When you are ready you can move into the "Reactor" routine from Graphics mode by pressing "R". Instructions will appear at the top of the screen showing you how to start your creation. Note that although the full eight character title is available you may have any smaller title by pressing <center>. Also remember that the title will be recorded in "lower case".

Graphic block chart.

	= A		= B		= C		= D
	= E		= F		= G		= H
	= I		= J		= K		= L
	= M		= N		= O		= P

If YOU don't fancy typing in the listing, then send £2.00 to Brian Hinson, 27 Melstock Road, Aylesbury, Bucks HP21 7HX and I will send you a tape containing Zippy on one side and Artist on the other.

```

10 DIM H$(32)
20 CLSO : BE=CHR$(128) : CE="14"+BE+"you"+BE+"would"+BE+"like"+BE+"instructions"
   : DE="press" : EE="!" : FE="otherwise"+BE+"press"+BE+"any"+BE+"other"+BE+"key"
30 PRINT # 1;1,CE : PRINT # 2;4, DE : PRINT # 3;4, EE : PRINT # 2;9, FE
40 SCREEN0,1
50 BE=INKEY$ : IF BE="" THEN 50
60 IF BE="1" THEN FOR A=0 TO 4 : GOSUB 640 : NEXT A : A=0
70 A$="" : BE="" : CE="" : DE="" : EE="" : FE="" : SE=""
80 CLS : PRINT # 32,"WHAT BACKGROUND COLOUR WOULD YOU LIKE?"
90 FOR I=0 TO 5 : PRINT# FOR "
100 FOR Y=1 TO 5
110 IF I=0 THEN I=1 ELSE I=0
120 PRINT CHR$(127+I+(16*X)); : NEXT Y : PRINT " PRESS "; : PRINT X : NEXT X
130 I=0 : Y=0 : X=0
140 BE=INKEY$ : IF BE="" THEN 140
150 B=ASC(BE)-48 : ELSE : B=0
160 P=1024 : F1=1024 : I2=32
170 SOUND 10,2
180 C=PEEK(IP1);POKE P,I2
190 IF PEEK(ANP00)<95 THEN CO=1 ELSE CO=0
200 PLAY "F#F"
210 IF PEEK(ANL49)=0 THEN I2=143+(16*I) : I2=1 ELSE I2=0 : I2=32
220 IF I=0 AND I2=1 THEN I2=32
230 KE=INKEY$;IF KE="" THEN POKE P,C : GOTO 180
240 POKE P,C
250 A=ASC(KE)
260 P=P-1;IF A=74 OR A=95 THEN P=P-32 : GOSUB 710 : GOTO 180
270 IF A=10 OR A=9 THEN P=P+32;GOSUB 710: GOTO 180
280 IF A=8 OR A=3 THEN P=P-1 : GOSUB 710: GOTO 180
290 IF A=9 OR A=3 THEN P=P+1 : GOSUB 710: GOTO 180
300 IF I2=1 THEN 420
310 IF CO=1 THEN 380 ELSE 330
320 *****PRINT LOWER CASE
330 IF A=4 THEN B=A
340 IF A=5 THEN B=0
350 IF A=6 THEN B=A-54
360 GOSUB 520 : GOTO 180
370 *****SHIFT-BUTTON PRESSED**
380 IF A=6 THEN B=A+4
390 IF A=3 THEN B=A
400 GOSUB 520 : GOTO 180
410 *****SHIFTLOCK ON-PRINT COLOUR
420 IF KE="." THEN I2=1
430 IF KE="," THEN GOSUB 1110 : GOTO 180
440 IF B=0 THEN I2=35 : GOTO 760
450 IF I2=0 THEN I2=0 : I2=143 : GOTO 180
460 IF KE="a" THEN I2=143+(16*B) : GOTO 180
470 IF A=7 OR A=12 THEN SOUND 50,5 ELSE 500
480 H$="NOT AVAILABLE: A-P : '2' OR 'R'"
490 GOSUB 600 : GOTO 420
500 B=128+(A-77)*(16+2)
510 GOSUB 520 : GOTO 180
520 ***HOW TO PRINT ON SCREEN
530 IF B=0 OR B>255 THEN SOUND 40,5 ELSE 560
540 H$="NOT AVAILABLE TRY AGAIN"
550 GOSUB 600 : RETURN
560 POKE P1,B : SOUND 10,1
570 P=P+1
580 GOSUB 710
590 RETURN
600 ***HOW TO GIVE HELP
610 FOR H=1024 TO (1024+32)
620 H$(H-1024)=PEEK(H)
630 NEXT H
640 R$(180), H$
650 KE=INKEY$ : SOUND200,1;IF KE="" THEN 650
660 A=ASC(KE)
670 FOR H=1024 TO (1024+32)
680 POKE H,H$(H-1024)
690 NEXT H

```

```

700 RETURN
710 'MAY TO STAY ON SCREEN
720 IF P<1024 THEN P=P+1
730 IF P>1024 THEN P=P-1
740 P=P
750 RETURN
760 'reprint raw char't'rass
770 IF K=12 THEN 180
780 I=35
790 IF A=119 THEN B=64 : GOTO 820
800 IF A=39 THEN B=A+38 : GOTO 850
810 IF A>43 AND A<50 THEN B=A-64 : GOTO 820
820 IF A=113 THEN 830
830 IF A=114 THEN B=A-70 : GOTO 850
840 IF A=119 THEN B=A-55 : GOTO 850
850 B=A+3
860 GOSUB 520 : GOTO 180
870 'instructions subtitles****
880 CLS:PRINT D
890 DE=" 1.Ca=" "+STRING$(30,CHR$(128))
890 DE=" "+STRING$(30," ")
900 FOR A=1 TO D
910 READ B
920 IF A="CR" THEN A=CHR
930 IF A="DB" THEN A=DB
940 B=32-LEN(A)
950 IF B<0 THEN A=CHR(A+B+64):GOTO 940
960 PRINT A:PAUSE""NEXT A
970 PRINT#402,"PRESS ANY KEY TO CONTINUE."
980 SCREEN=0,L
990 B=CHR$(128):IF B=" " THEN 990
1000 RETURN
1010 'data follows.
1020 DATA 14,10FF,"TITLE",CR,CR,YOU WILL BE ASKED TO CHOOSE THE BACKGROUND COLOUR
1030 FIRST AND,THE SCREEN WILL BE CLEARED,TO THAT COLOUR.,AT THIS STAGE YOU WILL,HA
1040 VE A NORMAL, BLACK CURSOR.,THE KEYBOARD WILL PRODUCE ,REVERSE CHARACTERS LIKE CH
1050 S.
1060 DATA IF YOU WANT NORMAL CHARACTERS,USE <SHIFT> LIKE A TYPEWRITER.,CR
1070 DATA 15,CR,WHEN YOU WANT TO USE,dragons's,GRAPHIC BLOCKS USE THE,SHIFTLOCK B
1080 Y PRESSING,<SHIFT> AND <0>.,CR,Now YOU HAVE A GREEN CURSOR.,TYPE THE LETTERS A-F
1090 ,AND YOU WILL OBTAIN GREEN BASED,GRAPHICS.,EACH TIME YOU TYPE '2' dragon,CHANGES
1100 COLOUR R
1110 DATA THROUGH ALL 8 COLOURS.,CR
1120 DATA 12,DF,DF,DF,PRESS '2' AGAIN & YOU MOVE INTO <DOUBLE> REVERSE MODE.,THI
1130 S MODE ALLOWS YOU TO OBTAIN,THESE 1<hex>1<hex>7<hex> SYMBOLS,but in reverse,AND MOR
1140 PH, NUMBERS 0-9,CR
1150 DATA CR,CR
1160 DATA 14,DF,CR,CR,IF YOU PRESS '2' AGAIN YOU,RETURN TO GREEN GRAPHICS,AND SO
1170 ON THROUGH THE COLOURS.,AT ALL TIMES THE ARROW KEYS,will MOVE THE CURSOR,WITHOU
1180 T INTERFERING,WITH YOUR SCREEN,CR,CR,CR
1190 DATA 14,DF,WHEN YOU ARE READY,(IN GRAPHIC MODE ONLY),PRESS 'R' TO RECORD YO
1200 UR,"SIMPY TITLE",CR,ERROR MESSAGES AND HELP,will APPEAR AT THE TOP OF,THE SCREE
1210 N,WITHOUT DESTROYING YOUR DESIGN!,ready,here goes
1220 DATA 34,CR
1230 '*****TO RECORD*****
1240 I=35
1250 MOTOR ON
1260 HZ="PRESS R WHEN TPE IS READY."
1270 SOUND 200,10 : GOSUB 400
1280 IF K=CHR$(128) THEN 1180
1290 MOTOR OFF
1300 HZ="THE R CHARACTER TITLE 1="
1310 GOSUB 400
1320 IF K=CHR$(13) THEN 1120
1330 HZ=HZ+CHR$(K) : Z=Z+K : IF LEN(HZ)>7 THEN 1220 ELSE 1190
1340 CLS:PRINT 24,1024,1535,1024
1350 FOR A=1 TO 10 : GOTO 1300+I
1360 NEXT A : Z=Z+1 : I=35
1370 RETURN

```

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Firmware

Brian Cudge explores the Dragon's ROM in a special series which builds up month by month into a firmware manual.

CDS Firmware Routines

The following ROM routines form the Cassette operating system, and can be used from within assembly language programs, and to some extent, from within Basic programs. All routines should be called by the JSR command, and all addresses are again given in decimal where possible (I have given the Tandy CDS00 (extended basic 5.1) equivalent address in brackets).

When calling any routine, assume that all registers may, potentially, be corrupted, unless stated otherwise.

Motor On

Dragon 48501 (Tandy 42654)

This routine turns on the motor relay by setting bit 3 of the I/O location 5FF21. It counts down the delay given in locations 14B1B0 before returning. The default for this delay is about 0.5 seconds.

Motor Off

Dragon 48504 (Tandy 42657)

Turns off the cassette relay by clearing bit 3 of the I/O location 5FF21, and returns immediately.

Audio On

Dragon 47852 (Tandy 42621)

On entry the B register must be zero for the routine to operate. The signal from the cassette port is channelled through the TV speaker. This is equivalent to the Basic Audio-On command.

Audio Off

Dragon 47811 (Tandy 42600)

Disables the cassette sound to the TV speaker.

Write Leader

Dragon 42755 (Tandy 42968)

Writes a leader out to the cassette, also switches on the motor relay by calling the Motor On routine. This leader consists of a number of bytes of 555. The number of bytes written can be changed by the user (see memory map).

Write 1st Block

Dragon 47900 (Tandy 42961)

Writes a leader by calling the write leader routine, and then writes a block by calling the 'Block Out' routine. It is necessary to set up the memory locations needed for the 'Block Out' routine before entering this routine.

Byte Out

Dragon 48556 (Tandy 42656)

Writes the byte in the A register to tape. This routine can be used to write your own customised cassette operating system if required.

Block Out

Dragon 47903 (Tandy 42962)

Writes a block of data out to the cassette. The cassette motor must be turned on first (this is left to after the 'write first block' routine, to save time). The output buffer address must be set up in locations 126127 and the length of data to be written (after then 255) should be set up in location 1023 before entering the routine.

Write Basic

Dragon 47577 (Tandy 42966)

Writes the current Basic program to tape in tokenised form. The filename should be stored in locations 465-475, and the filename length in location 465. The action of this routine is similar to CSAVE.

Write Binary

Dragon 42966 (Tandy 42657)

This routine will produce a complete binary file on tape, suitable for loading into Basic using the CLOAD command, or back into an assembly program using other routines, such as 'Read Binary'. It is unusual in that the 'JSR' command is used to enter it, rather than the JSR command. The return address should be pushed on to the stack as the first item, followed by the start address of the data, and the entry address. The start and entry addresses should also be stored in locations 467-468 and 469-466. These can differ from those pushed on to the stack if it is required to load the file at an address other than that from which it was saved. Again, the filename is also set up before calling the routine (see memory map).

Close Files

Dragon 46867 (Tandy 42903)

Closes any open cassette stream. This has the action of 'flushing' the cassette buffer and writing an EOF block to tape. No action is taken if the cassette stream is not in use. This is similar to the CLOS6 command in Basic.

Read Leader

Dragon 46815 (Tandy 42876)

Prepares the CDS for loading. The cassette

motor is turned on, and the routine waits for the leader tone. No data is actually read, and the motor is left on when this routine returns.

Bit In

Dragon 48549 (Tandy 42637)

Reads a single bit into the Z condition code. This routine forms part of the 'Byte In' routine and is of specialised use only on its own.

Byte In

Dragon 48557 (Tandy 42625)

Reads a single byte into the A register. This can be used in association with the 'Byte Out' routine to write your own Cassette operating system.

Block In

Dragon 47902 (Tandy 42963)

Reads a block of data into the cassette buffer (pointed to by locations 126127). The various flags, such as EOF and Error, are updated. The Z condition code is cleared (BVC) if an error occurred.

Read 1st Block

Dragon 47411 (Tandy 42953)

Cells the 'read leader' routine, and the 'block in' routine to get the filename block into the cassette buffer. The Z condition code is cleared (BVC) if an error occurred.

Find File

Dragon 47563 (Tandy 42955)

Searches tape for a filename matching that set up in 466-475. The tape will be positioned just before the first data block of the file on return, with the filename block in the cassette buffer.

Read Binary

Dragon 48900 (Tandy 42957)

This routine should be called after first calling the 'Find File' routine to read in the header and position the tape correctly. The routine is used to read in binary files, saved by the 'Write Binary' routine, or from basic using CSAVE. On entry, the X register should contain the offset to be added to the load address in the header (locations 467-468); this will normally be zero. If the file type byte in the header is not set to 2 (binary file) then an FPM error is produced.

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"Linkword seems to be an excellent program, with much enjoyment to be had from it."
Dragon User, May '85

Doing the Splitz on your Dragon

Peter Whittaker wanted to have text and graphics on-screen together, but without writing text to the graphic screen — here's how he managed it

THERE HAVE been several routines published which will enable the mixing of text and graphics on the Dragon's graphics screen. However, they are all quite long, and are often complicated to use. Rather than following the trend of copying text to the graphics screen, I decided to try to get my Dragon to display both the Text mode and the Graphics mode at the same time. Furthermore, this was to be achieved with minimal disruption to the normal functioning of the computer.

The obvious way to start seemed to be by exploring the possibility of an interrupt-driven routine. Every fifth of a second, the computer interrupts what it is doing, and services the interrupt request. Then it returns to what it was doing before. By redirecting the interrupt routine to our own programs, we can insert a new dimension to the computer's performance. New sound routines can be written, or sprites can be added, and on this occasion, the display routine can be updated.

affected. Commands can still be entered, programs can be loaded and saved, circles can still be drawn and filled in. However, the 50 cycles per second flicker of the screen is very distracting, and so the program is not adequate.

What is needed is a more frequent interrupt routine which will generate refresh faster than the 50 cycles per second of the screen display, and will enable us to change display modes half-way down the screen. By displaying the test screen for the first half of each fifth of a second, and the graphics screen for the second half, we should get a graphics window on the test screen. This fast interrupt is provided by the Horizontal Sync Interrupt (HI) which when enabled will occur at the start of each of the 264 scan lines of the display every fifth of a second. That makes a total of 12800 interrupts per second. This interrupt is so frequent that there are only about 70 clock cycles between interrupt requests. The slower our routine runs, to below 70 ns per line, the

Poke to clear	Poke to set	Function
\$PPO0	\$PPO1	Display mode 3 bit pattern
\$PPO2	\$PPO3	
\$PPO4	\$PPO5	
\$PPO6	\$PPO7	Display address offset 16K steps 7 bit pattern
\$PPO8	\$PPO9	
\$PPOA	\$PPOB	
\$PPOC	\$PPOD	
\$PPOE	\$PPOF	
\$PPOH	\$PPOI	
\$PPOJ	\$PPOK	

100

slower the computer becomes, until it spends all its time servicing interrupts, and has none left for its normal functioning.

However, once the routine gets longer than 70 bytes, as with SPUTZ, the computer will start to ignore some of the interrupts. What? It is still servicing one interrupt, it will ignore all further interrupt requests. Because of this, it has not been possible to count down the exact number

```

1. 计算 1 到 100 的和 100 分
2. 计算 1 到 100 的平方和 100 分
3. 计算 1 到 100 的立方和 100 分
4. 计算 1 到 100 的平方根 100 分
5. 计算 1 到 100 的立方根 100 分
6. 计算 1 到 100 的平方根的平方 100 分
7. 计算 1 到 100 的立方根的立方 100 分
8. 计算 1 到 100 的平方根的平方和 100 分
9. 计算 1 到 100 的立方根的立方和 100 分
10. 计算 1 到 100 的平方根的平方和的平方 100 分
11. 计算 1 到 100 的立方根的立方和的立方 100 分
12. 计算 1 到 100 的平方根的平方和的平方和 100 分
13. 计算 1 到 100 的立方根的立方和的立方和 100 分
14. 计算 1 到 100 的平方根的平方和的平方和的平方 100 分
15. 计算 1 到 100 的立方根的立方和的立方和的立方 100 分
16. 计算 1 到 100 的平方根的平方和的平方和的平方和 100 分
17. 计算 1 到 100 的立方根的立方和的立方和的立方和 100 分
18. 计算 1 到 100 的平方根的平方和的平方和的平方和的平方 100 分
19. 计算 1 到 100 的立方根的立方和的立方和的立方和的立方 100 分
20. 计算 1 到 100 的平方根的平方和的平方和的平方和的平方和 100 分

```

Listing #1 (Assembler 'C') is a short interrupt-driven routine. The program works by redirecting the interrupt vector BH130 to the new routine. This interrupt would ideally well suited for the task, because it is synchronized with the start of the television display. The interrupt occurs just before each time the television picture is renewed. This interrupt is called the Frame Sync Interrupt, or FI for short. This routine alternately selects the graphics and then the text modes, by changing the starting lamp vector each time through the routine. When run, this program does indeed display both text and graphics modes together, and the normal operation of the computer does not seem to be

Abstract 1. The following abstracts are from the 1998 Annual Meeting of the American Psychological Association, held in San Francisco, California, from August 1-5, 1998.

[illegible]

interrupts have been serviced, and that the next interrupt request can be serviced. If those registers are not read from before the interrupt is finished, then the computer will not service any more interrupt requests.

When run, this program will successfully split the screen in half. The top half will display the text screen, and the bottom half the PMode3,1 graphics screen. Fig. #1 gives the memory layout of the tape display screen. It can be seen that only half of the text screen is displayed as text, while the other half appears as a thin band of graphics display at the top of graphics page #1. This produces two problems. The first is that when we CLS the text screen we also put some ugly characters on the top of the graphics display, and secondly, whenever the computer prints below the eighth line of the display, we cannot read it. The first problem is easily solved. Assembler #2 includes a short BI routine, or CLS, which will fill in the bottom

1024

Top half of text screen

Text mode display

1280

Bottom half of text screen

1536

Graphics pages 1 and 2

PMode 3,1 graphics display

4352

Figure 1

Sync interrupt vector at 44010D to its normal value, and disconnects the print modification routine. When called, 000C44010D this program will cancel the

and display the SPLITZ screen. SPLITZ can be reconnected at any time by 000C3271D.

Program Alterations

Listing #3 includes all three machine code routines (#1-3), and a BASIC demonstration program. Once the workings of the routines are fully understood, the demonstration program can be deleted (lines 140 to end), and the loader alone kept for future use.

Once the workings of the routines are fully understood, the demonstration section can be deleted (lines 140 to end), and the loader alone kept for future use.

Table 2 gives a list of addresses and values which will alter the display produced, and affect the area of memory displayed.

As listed the program will not work properly with the Dragon DCS connector. The DCS connector will intrude on the graphics window.

It should be possible to convert the program, by changing the display offset to start at 40872 instead of a 000A, and re-writing the print routine to copy text up into higher memory. However, the conversion will not be perfect, for the text displayed will be a part of the graphics memory, and so be subject to intrusion by graphics commands.

The machine code can be saved by 'SAVEM "SPLITZ", 30000, 844F6C, 844F6C. Remember to CLEAR 300, 3000 before loading, and be warned that using the PLAY or SOUND commands will cause the system to crash beyond recovery.

Good luck — and try experimenting with SPLITZ.

0000	0000		0000	0000	
0001	0000		0001	0000	
0002	0000		0002	0000	
0003	0000		0003	0000	
0004	0000		0004	0000	
0005	0000		0005	0000	
0006	0000		0006	0000	
0007	0000		0007	0000	
0008	0000		0008	0000	
0009	0000		0009	0000	
000A	0000		000A	0000	
000B	0000		000B	0000	
000C	0000		000C	0000	
000D	0000		000D	0000	
000E	0000		000E	0000	
000F	0000		000F	0000	
0010	0000		0010	0000	
0011	0000		0011	0000	
0012	0000		0012	0000	
0013	0000		0013	0000	
0014	0000		0014	0000	
0015	0000		0015	0000	
0016	0000		0016	0000	
0017	0000		0017	0000	
0018	0000		0018	0000	
0019	0000		0019	0000	
001A	0000		001A	0000	
001B	0000		001B	0000	
001C	0000		001C	0000	
001D	0000		001D	0000	
001E	0000		001E	0000	
001F	0000		001F	0000	
0020	0000		0020	0000	
0021	0000		0021	0000	
0022	0000		0022	0000	
0023	0000		0023	0000	
0024	0000		0024	0000	
0025	0000		0025	0000	
0026	0000		0026	0000	
0027	0000		0027	0000	
0028	0000		0028	0000	
0029	0000		0029	0000	
002A	0000		002A	0000	
002B	0000		002B	0000	
002C	0000		002C	0000	
002D	0000		002D	0000	
002E	0000		002E	0000	
002F	0000		002F	0000	
0030	0000		0030	0000	
0031	0000		0031	0000	
0032	0000		0032	0000	
0033	0000		0033	0000	
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0036	0000		0036	0000	
0037	0000		0037	0000	
0038	0000		0038	0000	
0039	0000		0039	0000	
003A	0000		003A	0000	
003B	0000		003B	0000	
003C	0000		003C	0000	
003D	0000		003D	0000	
003E	0000		003E	0000	
003F	0000		003F	0000	
0040	0000		0040	0000	
0041	0000		0041	0000	
0042	0000		0042	0000	
0043	0000		0043	0000	
0044	0000		0044	0000	
0045	0000		0045	0000	
0046	0000		0046	0000	
0047	0000		0047	0000	
0048	0000		0048	0000	
0049	0000		0049	0000	
004A	0000		004A	0000	
004B	0000		004B	0000	
004C	0000		004C	0000	
004D	0000		004D	0000	
004E	0000		004E	0000	
004F	0000		004F	0000	
0050	0000		0050	0000	
0051	0000		0051	0000	
0052	0000		0052	0000	
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0054	0000		0054	0000	
0055	0000		0055	0000	
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0058	0000		0058	0000	
0059	0000		0059	0000	
005A	0000		005A	0000	
005B	0000		005B	0000	
005C	0000		005C	0000	
005D	0000		005D	0000	
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0067	0000		0067	0000	
0068	0000		0068	0000	
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0075	0000		0075	0000	
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0078	0000		0078	0000	
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007A	0000		007A	0000	
007B	0000		007B	0000	
007C	0000		007C	0000	
007D	0000		007D	0000	
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0088	0000		0088	0000	
0089	0000		0089	0000	
008A	0000		008A	0000	
008B	0000		008B	0000	
008C	0000		008C	0000	
008D	0000		008D	0000	
008E	0000		008E	0000	
008F	0000		008F	0000	
0090	0000		0090	0000	
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0099	0000		0099	0000	
009A	0000		009A	0000	
009B	0000		009B	0000	
009C	0000		009C	0000	
009D	0000		009D	0000	
009E	0000		009E	0000	
009F	0000		009F	0000	
00A0	0000		00A0	0000	
00A1	0000		00A1	0000	
00A2	0000		00A2	0000	
00A3	0000		00A3	0000	
00A4	0000		00A4	0000	
00A5	0000		00A5	0000	
00A6	0000		00A6	0000	
00A7	0000		00A7	0000	
00A8	0000		00A8	0000	
00A9	0000		00A9	0000	
00AA	0000		00AA	0000	
00AB	0000		00AB	0000	
00AC	0000		00AC	0000	
00AD	0000		00AD	0000	
00AE	0000		00AE	0000	
00AF	0000		00AF	0000	
00B0	0000		00B0	0000	
00B1	0000		00B1	0000	
00B2	0000		00B2	0000	
00B3	0000		00B3	0000	
00B4	0000		00B4	0000	
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00B7	0000		00B7	0000	
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00BA	0000		00BA	0000	
00BB	0000		00BB	0000	
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00C0	0000		00C0	0000	
00C1	0000		00C1	0000	
00C2	0000		00C2	0000	
00C3	0000		00C3	0000	
00C4	0000		00C4	0000	
00C5	0000		00C5	0000	
00C6	0000		00C6	0000	
00C7	0000		00C7	0000	
00C8	0000		00C8	0000	
00C9	0000		00C9	0000	
00CA	0000		00CA	0000	
00CB	0000		00CB	0000	
00CC	0000		00CC	0000	
00CD	0000		00CD	0000	
00CE	0000		00CE	0000	
00CF	0000		00CF	0000	
00D0	0000		00D0	0000	
00D1	0000		00D1	0000	
00D2	0000		00D2	0000	
00D3	0000		00D3	0000	
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00D7	0000		00D7	0000	
00D8	0000		00D8	0000	
00D9	0000		00D9	0000	
00DA	0000		00DA	0000	
00DB	0000		00DB	0000	
00DC	0000		00DC	0000	
00DD	0000		00DD	0000	
00DE	0000		00DE	0000	
00DF	0000		00DF	0000	
00E0	0000		00E0	0000	
00E1	0000		00E1	0000	
00E2	0000		00E2	0000	
00E3	0000		00E3	0000	
00E4	0000		00E4	0000	
00E5	0000		00E5	0000	
00E6	0000		00E6	0000	
00E7	0000		00E7	0000	
00E8	0000		00E8	0000	
00E9	0000		00E9	0000	
00EA	0000		00EA	0000	
00EB	0000		00EB	0000	
00EC	0000		00EC	0000	
00ED	0000		00ED	0000	
00EE	0000		00EE	0000	
00EF	0000		00EF	0000	
00F0	0000		00F0	0000	
00F1	0000		00F1	0000	
00F2	0000		00F2	0000	
00F3	0000		00F3	0000	
00F4	0000		00F4	0000	
00F5	0000		00F5	0000	
00F6	0000		00F6	0000	
00F7	0000		00F7	0000	
00F8	0000		00F8	0000	
00F9	0000		00F9	0000	
00FA	0000		00FA	0000	
00FB	0000		00FB	0000	
00FC	0000		00FC	0000	
00FD	0000		00FD	0000	
00FE	0000		00FE	0000	
00FF	0000		00FF	0000	

Listing 2 – Splitz demonstration

LISTING #2. SPLITZ DEMO.

```

10 CLS
20 *****MACHINE CODE LOADER*****
30 CLEAR255,32555
40 FOR A=32551 TO 32749
50 READ B:POKE A,B
60 NEXT A
70 DATA 142,5,8,134,8,167,128,148,6
,8,37,249,57,142,127,9,191,1,12
,57,142,127,27,191,1,13,182,255
,1,198,1,183,255,1,182,255,2,59

80 DATA 124,127,183,182,127,183,129
,89,37,59,126,127,48,134,182,18
3,255,34,183,255,195,183,255,18
7,183,255,198,142,127,71,191,12
7,38,127,127,183
90 DATA 124,127,183,124,127,183,32,
25,134,7,183,255,34,183,255,194
,183,255,196,183,255,198,142,12
7,48,191,127,38,127,127,183,32,
8,182,255
100 DATA 2,182,255,8,59,28,8,8,8,8,
251,251,251,251,142,127,124,191
,1,184,134,128,183,1,183,57,38,
22,198,8,136,129,13,39,7,149,4,
255,37
110 DATA 38,32,5,148,4,224,37,31,14
2,4,8,235,136,32,237,129,148,4,
224,37,244,134,36,167,129,148,5
,8,37,249,198,8,136,48,136,224,
191,8
120 DATA 136,53,22,57,4,255,255,255
,255,4,4,4,4,255,255,255,255,14
2,127,199,191,1,13,57,142,157,6
1,191,1,13,182,255,1,132,354,18
3,255,1
130 DATA 134,57,183,1,183,182,255,2
,182,255,8,59,8,8,8,251,251,183
,127,2,126,127,118,251
140 *****DEMO PROGRAM*****
150 CLS
160 PHODE3,1:POL3
170 PRINTB12,"SPLITZ":PRINT:PRINT"
EASY TEXT AND GRAPHICS UTILITY"
:PRINTTAB(7,7)"BY PETER WHITTAKER"
"
180 PRINT:PRINTTAB(3,7)"DEMO-STATION
"
190 FOR A=4 TO 1 STEP -1
200 COLOR A
210 CIRCLEX(125,45),A;18
220 PRINT(125,45);A;A
230 NEXT A
240 EXEC$H7F66:EXEC32551
250 GOSUB388
260 PRINT:PRINT"BECAUSE SOME ROM RO
UTINES AFFECTING THE INTERRUPT SYSTE
M, THE SPLIT SCREEN WILL OCCUR
IONLY BE THROWN OFF BALAN
CE, HOWEVER, IT WILL QUICKLY RE
TURN TO NORMAL."GOSUB388
270 PRINT:PRINT:PRINT"Please note t
hat the sound and Play command
s will cause the system to c
rash beyond recovery."GOSUB388

280 PRINT:PRINT"THE GRAPHICS DISPLA
Y MODE CAN BECHANGED BY POKING
TO $H7F23. GRAPHICS MODES 3
AND 4, COLOUR SETS 0 AND 1 CAN
BE DISPLAYED, AS WELL AS SEVE
RAL OTHER MODES."GOSUB388
290 PRINT:PRINT:PRINT:PRINT"MODE3,
1 = COLOUR SET 1":PRINT:PRINT"P
OK$H7F23,173":PRINT:POKE$H7F29
,173:GOSUB388
300 PRINT:PRINT:PRINT:PRINT"MODE4,
1 = COLOUR SET 0":PRINT:PRINT"P
OK$H7F23,245":PRINT:POKE$H7F29
,245:GOSUB388
310 PRINT:PRINT:PRINT:PRINT"MODE4,
1 = COLOUR SET 1":PRINT:PRINT"P
OK$H7F23,255":PRINT:POKE$H7F29
,255:GOSUB388
320 PRINT:PRINT:PRINT:PRINT:PRINT:P
RINT:PRINT"AND ALL THE REST....
..."GOSUB388:FOR A=3 TO 255:PO
KE $H7F29,A:NEXT A:POKE$H7F29,1
64
330 PRINT:PRINT:PRINT:PRINT:PRINT:P
RINT:PRINT:PRINT"THE TEXT SCREE
N MAY ALSO BE CHANGED, BY P
OKING TO $H7F48."PRINTTAB(7,7)
"(<PRESS ANY KEY>)"EXEC$1194:FOR
A=0 TO 255:POKE $H7F48,A:NEXT A

340 POKE$H7F48,7:FOR A=0 TO 255:POK
E$H7F48,A:NEXT
350 EXEC$1194:PRINTB7,"TEXT AND GR
APHICS":PRINTB42,"-(SPLITZ)-":
PRINTB231,"BY PETER WHITTAKER"

360 EXEC$1194:EXEC$H7F68:CLS:PRINT"
ROUTINE DISCONNECTED.....":PR
INT"EXEC$H7F66 TO RECONNECT SPLI
TZ":END
370 STOP
380 PRINTTAB(8,5)"(<PRESS ANY KEY>)"EX
EC$1194:RETURN
390 "(C) 1985 PETER WHITTAKER.
```




I'VE GOT some good news and some bad news for you, and it's one and the same thing, which is that several adventures are available at really bargain prices. Good for the pocket, but not such a good sign for future Dragon adventures being published. I see that Mirrorsoft has taken over a range of Salamander titles, and these include the adventures *Franklin's Tomb*, *Last in Space*, *Wings of War* and *Clockwork Incident*. All these are well worth the £1.95 being asked for them, though if you bang off a cheque there's also a 10p postage charge per order. If you're at all interested in writing your own adventures then you might also consider getting Mirrorsoft's own *Rainbow Writer*, which has just been reduced from £19.95 to £4.95. This allows you to easily redefine the character set to produce something like the small print style used in the *Mysterious Adventures* series.

Adventurer's Club

If you've seen the advertisements from Jani Penn (Cassport Software) you'll have noticed some bargains going there, too. For £1.50 you can find *Black Sanctum*, *Philgrave's Diary* and *Mystery of the Jade Star*. Smaller discounts are available on a wide range of adventures from an organisation I first mentioned a couple of months ago. The *Adventurer's Club* Ltd, at 64c Mendle Road, London NW2 3PH. The price cuts are generally little more than £1, but they do offer all the Adventure International range, as well as *Nemesis* and *Incentive* titles, plus the interesting *El Diablero* at £1.48 including postage. You have to be a member, of course, and as I've never seen the second and third of their monthly dossiers I can recommend them even more than I did a couple of months ago. Both dossiers run to 20 pages, and as well as in-depth looks at old favourites like *Valhalla*, *Shenlock*, *The Hobbit*, *Zook* and *El Diablero*, there are plenty of new reviews, letters pages, swap page, news, a competition, a help line and an adventure-writing feature. Thanks to reader Richard Marshall of Tardisgate Works for sending me the dossiers, and for reporting how pleased he is with the club.

Richard had asked me how to open the last sheet in *Caverns of Doom*, which is done by: MORE LEKS EHTH AENO NUOF MIKE HTON ISU. Quite a few readers have said how keen they are to see a help

line established, and many have already made use of the coupon now being printed, with others saying let's have more clues in the column, too. Your wish is our command, so readers, so if you have a simple question on one adventure then use the coupon, or if it's a complicated question then write to me, and also let me know your clues, bugs and your boasts about adventures completed.

First in with some solutions to problems is Robert Field of Hilsford, Sandford Avenue, Church Stretton, Shropshire SY7 7AB. In *Shenmagere*, Robert says, to get past the snake: NAME CHOC HTON IVOM YBRC OFMA HSHH TTEG. In *Mountains of Kef* to avoid the Dragon: PMAR EHTN OLIO RUOP. To find the black box in *Wings of War*: RALL SCHE RCT AAWB DOHF FORD. Ah, so that's what you do with the golf, thank you Robert. He also wants to know is where he can buy *El Diablero* and *Madness and the Minotaur*. The former he can buy from Mirrorsoft, but sadly *Madness* doesn't seem to be available at the moment. Perhaps some reader might be interested in doing a swap with Richard, who's successfully completed several adventures, or perhaps some enterprising software house might make *Madness* available again.

Jan van Bels of 51 Penge Road, Little Sutton, South West L20 2GJ is stuck in *Sea Quest*, wanting to know what the metal detector is for and also how to get past the pirats. I've had more than one reader unable to pass the persistent pirate, who likes a drop of the hard stuff. But where to find the hard stuff? IIRC TANT GED TSLU. The metal detector, Jan, is for using, naturally enough, but again the main question is where? Well, in two places, actually, one not too far from where you first find it, the other somewhere else where the ground might be soft enough to dig in if the detector gives you a response. Jan offers help on *Black Sanctum* and *Calico Island*, in exchange for help on *Shenmagere*, where he says he's floundering a little, though his letter wasn't specific enough to enable me to help. That's a point worth making, as readers do sometimes write in with a very vague question which is impossible to answer. It's difficult to help if all that you know is that the reader's stuck in the adventure, or that they're wandering around, or they've hardly got started, or they've nearly

finished. One reader told me he'd nearly finished an adventure, but when he outlined the problem it was obvious he'd hardly started, so do try to tell me the obstacle you can't get past or the object you can't find a use for.

Frustrated Hulk

It also helps if you give a name and address. Someone has written to me with problems on *The Hulk* and *Rio-Aku*. I can't know the second adventure, but even if I did I could hardly address the answers to "A very frustrated Hulk." I suppose we could ask every postman in the country to look out for a large green person wearing a Dragon-computer, but it might take a while. It's surprising how many readers write in with two problems in the same adventure, with both problems being related. Mark Galsley asks in *Shenmagere*: "I can't get past the snake because I can't find the shamrock, and what use is the woman in the field?" Those two problems are connected, and the answer's been given above, but can anyone help Mark on the following: (1) In *El Diablero*, how to get past the tunnels after pushing down the wall and killing the spirit slave, (2) In *Madness and the Minotaur*, where to find the cat with the cat, and (3) In *Shyppr*, how to kill the alien and how to find a space-act with no holes in it. Help to Mark at 157 Pinnerwood Park, Croy, Farnborough, Hants GU14 9LE.

Shyppr is confounding lots of people, including David R. Hunt at 16 Harford Gardens, Grove Lane, London SE25 6DB. "How can you fight against Darth Vader and win?" Indeed, I only wish I knew, and the sooner some reader can tell me, the better. David offers some help on *Caverns of Doom*, advising you not to use the flashlight early on, if at all possible, as you will need this later when swimming under water. If you weren't aware that there was any swimming to be done, incidentally, then: AFRAN RHTS EWAH LLAM GRL EMLR COW MAKE. David has various questions on various adventures, so I've put him in touch with various experts, but one of his questions I'll deal with here, and that's how to get past the wall that's in a mine corridor in *Mountains of Kef*: OLIO PYAG DRAC HAWY TROAC.

No problems on *The War Trilogy* for fleet Mail, who completed all three in three weeks. If you'd had a Spectrum when the

adventure first came out. But, you might have won yourself the video recorder. But lives at 37 Carlon Close, Hartley, Dartford. Kent DA3 7DS, and offers help on Kel as well as Cimmerian Moon, Death Moon of Shus, El Diablero, and several others which I've managed to complete myself so won't list here. Be's struggling on Return of the Ring, however, being "bores with killing endless mutants and looking for an oracle and a stone." Help to list in Dartford, and if you're asking for help, which obviously applies when writing to anyone, do remember to enclose a stamped, addressed envelope. You might not think it matters, as you're only sending out one letter, but it makes a lot of difference to the person receiving ten or twenty or even more.

Matthew Lodge of Northwich in Cheshire is proving himself to be a regular bug-hunter. After scoring 100% in Mountains of Kel, he's discovered a way of getting round the feature in The Cocklewood Incident which won't allow you to QUIT. Normally it says, "No, I won't let you," and as Matthew points out this can be a bit of a pain if you do want to start afresh. But he discovered that if you type in a string of 30 characters with no spaces and obviously not commencing with a recognisable word,

then the program scrolls up, crashes with an error, but then auto-runs again from the start.

I've now typed up Paul Watson's solution to Cocklewood, so if anyone wants a copy of that then send me a stamped addressed envelope, but remember it's a solution to the game and not merely a help sheet, so be careful how you make use of it.

As I've released this month, as you will have realised by now, but let's finish on a little bit of good news which I've just heard. Questline Software will be publishing a text adventure called The Ward of Kael,

which reader Bob Adridge of Girdleford sent in to me a while ago. Bob wrote it the hard way, using a book called Exploring Adventures on the Commodore 64 by some writer named Peter Gerard (never heard of him.) Bob actually developed the program under the Dragon DOS system, and as soon as he's made the changes that Cocklewood has asked for then it'll be releasing it pronto. It's hoped that it will be ready in time for the next S&S Showcase, so perhaps some of you will see it there. Perhaps I might see some of you there. Where to find me? K&N ROAD MYTH MENT RABE HTW KOOL. ■

Adventure Contact

To help puzzled adventurers further, we are instituting an Adventure Helpline — simply fill in the coupon below, stating the name of the adventure, your problem and your name and address, and send it to Dragon User Adventure Helpline.

Adventure Problem.

Name _____

Address _____

line, 12-13 Little Newport Street, London WC2H 9PP. As soon as enough letters have arrived, we will start printing them in the magazine.

Don't worry — you'll still have Adventure Trial to write to as well!

Oct 85

Adventure Contact

Adventure Callisto Island Problem On reaching the native ceremonial ground I am stuck on how to continue. Name Sean Upson Address 28 Ashford Road, Shanklin, Isle of Wight

Adventure Return of the Ring Problem Cannot breathe in Forest Moon and cannot find anything to help me, can't get clue pass Name Neil Huggins Address 8 Monmouth Court, Hareslippey, Gairpethy, Mid Glamorgan, South Wales

Adventure Pellegrius Diary Problem How do you get a job and how to you get into the Burecratic Hotel Name Paul Marlow Address 56 Lime Avenue, Bantley, Walsall, West Midlands W68 2EP

Adventure Sea Coast Problem I can do quite a lot on Sea Coast but I can't find a key to open the tapdoor in the beach house Name Scott Madden Address 34 Almond Place, Birmingham, Cheshirefield, Derbyshire

Adventure Syzygy Problem I have already got a first sheet, but can't find out how to kill the huge ugly alien and get the cube Name P A Ranscroft Address 40 Cedar Road, Wilmet, West Midlands WV13 3EZ

Adventure Madness and the Minotaur Problem No light to

get down the stairs, can't get to the forest Name K. Miller Address 25 Ramoth Road, Redhouse Estate, Sunderland, Tyne and Wear SR6 5EU

Adventure Possidon Adventure Problem How to get out of the first three rooms of the ship Name Vic James Address 8 Lanchdown Road, Allen, Harle GU34 2HE

Adventure Return of the Ring Problem How do you get the moonwalker? What is a backer? Name Graham Wright Address 17 Stanton Crescent, Knutsford, Cheshire

Adventure Kot Trilogy — Temple of Voss Problem How do you get to the large doors in the middle Name Gerard Purnell Address 35 Murton Lane, Newton, Middlesbrough, Cleveland DA3 4TR

Adventure Kot Trilogy (Part One) Problem How to get past the combie once I have got past the skull Name Michael Cooper Address 53 Old London Road, Potters, Brighton BN1 5PA

Adventure Sea Coast Problem Where is the diamond ring? Name Duncan Lawrence Address 18 Downy Close, Barry, South Glamorgan CF64 6BT

Adventure Shamanigara Problem I can't get out of jail, I

can't read the sign outside the bedroom window Name Leah Byrne Address 10 Melville Road, Dartington, Co. Dartmouth DL1 5EP

Adventure Callisto Island Problem How do you get past the natives? What use is the shovel? Name Anthony Fine Address 12 Woodward Avenue, Hendon, London NW4 4NY

Adventure William Shurg and Wings of War Problem I can't get into the church in Williamsburg, and I can't get back to Sighty in Wings of War Name David Kestall Address Woodtop Farm, Goswongh, Preston, Lancs PR4 2BA

Adventure Return of the Ring Problem How do you get the key off the game? Where is the book of skulls? Name David Hatfield Address 26 Meadow Avenue, Porsell, near Blackpool.

Adventure Syzygy Problem Most of it Name Jan van Sive Address 51 Forge Road, Little Sutton, South Wirral L68 3SG

Adventure Return of the Ring Problem How do I get the chest open in Hain's Temple Name Marcus Handford Address 3 Maplemeads, King's Drive, Birkopdown, Bristol BS7 5JG

Adventure El Diablero Problem I can't get out of the yellow tunnel — I've pushed the wall but can't do anything else Name Paul Spillhouse Address 41 Basky Girth, Burton Poles, near Hull HU12 5AF

Adventure Black Sanctuary Problem Can't find the claw hammer Name Robin Gibbs Address 8 Lewis Terrace, Penclawen, Merthyr Tydfil, Mid Glam CF47 6LH

Adventure The Hulk and Pa-Nu Problem How to get past the Jaws and how to get out of the cave with scorpions on the walls Name Christopher Telford Address 25 Wetherby Road, Tringham, Skegness-Trent ST4 5AZ

Adventure El Guldren Problem Getting out of shaft after killing slave Name K. Morley Address 12 Stoner Street, Hemford HR12 2PL

Adventure Return of the Ring Problem How can I survive the Forest Moon? I can't breathe there Name Ole Kristian Jullseth Address Fjellvarden 30, 4600 Kristiansund, Norway

Adventure Madness and the Minotaur Problem Where is the mapbook? I need to learn the first spell Name Roger Dick Address 21 Nuth Road, Selma, Fla.

Game for a laugh

Program: The Games Catalogue, Datacom, 4375 Hockley Grove, Birmingham B15 4JF
Price: £3.95

THIS IS supposed to be the best compilation tape on the market. Judging by the standards of the others that is probably a fact, but is not a lie!

The tape contains nine Basic games and a program advertising other Datacom products. I will talk about my general impressions first and then say a few brief words about each game in turn.

The programmers at Datacom are quite obviously masters of the graphic page. All the games containing graphics have the most beautifully designed text on the home screen, and some fantastic background pictures.

Sadly the games themselves are so totally unoriginal the only surprises come when you find out that "Landing at the alien base at noon on the day of the Gaurmah worshiping ceremony" is actually a game which involves a helicopter descending over a city and having to bomb said city away to enable landing! This is the major problem — the games are executed brilliantly but so what? They're only fun when they are played with two or more people and even then there's nothing here that amateur programmers

couldn't write themselves.

Execution is a glorified version of hangman, nice graphics, but fails to create any sense of excitement.

Snail Pace is a good game for more than one person but it's a shame there's no option to set the number of snails at the meeting. Forget it for a solo game.

Interplanetary Trader has a nice internal logic but provides the the physical space shoot-out isn't it.

Atom Hunt: The board game (Black Box) is a much better idea: this game doesn't really work on a computer.

Empire: Ever heard of a game called Kingdom?

Also in my opinion the best game on the cassette, I really enjoy playing this in competition, but I hate playing it solo.

An Assault: Landing at the alien base at noon on the day of the Gaurmah worshiping ceremony.

Murphy's Mansion: A real let down, as it plays for far too long on the test screen, but my sister loved it (there's no accounting for taste).

Wipeout: This version of Space is presented fantastically and plays awfully, or should that be looks awful and plays well?

Jason Choum



Screen Dumper

Program: Dumper, MacGowan Consultants, 6 Ashton Drive, Caythorpe, N. Grantham, Lincs.
Price: £3.50

DUMPER is a sophisticated screen dump program from MacGowan Consultants, the company that produces Printer Control. The copy reviewed here was configured for the Epson printer, but MacGowan can supply a copy suitable for use with almost any printer, given the appropriate control codes for graphics on/off etc.

The tape contains two programs. A Basic program is first

loaded in and run; this loads in the machine code screen dumper and copies it to low memory. You can then save a copy to your own tape at the default position at the top of memory, or at a different place. This is particularly useful for Dragon 64 owners, who want to use the program in 64 mode. As well as operating on the Dragon 32 and Dragon 64 (in either mode), the program is also compatible with Dragonites. The Basic program has an option to save to disk but MacGowan has made the classic mistake of typing in the program without DOS attached, so that all you get is

a Syntax error if you try to use this option. The answer is to type EDIT 300, and press ENTER, which tolerates the line correctly.

Dumper is accessed from within your own Basic programs using the USR function, with a command string similar to that used in the PLAY and DRAW commands. Various parameters can be changed, such as margins, density. Section of screen to be copied, number of copies etc. All of these parameters have useful default values, and can be reset by the X command.

For example, the string "BC1EC35SL1EL34" would produce a straight forward dump of the current screen (as set by the Mode command). Screen dumps can either be horizontal or vertical, with sizes of 1, 2, 4 or 8, if this all sounds familiar then that is because the options available are almost identical to those in

the Printer Control program. The documentation supplied consisted of two sides of text explaining how to load, copy and use the program, as well as some useful information for users who want to achieve Dumper from within their own machine code programs.

This is certainly the most powerful machine code, stand alone, screen dump program I have seen and it only occupies 18 of RAM. However, even at £3, I can't help but feel that most users already have adequate screen dump programs for their printers — several have appeared on the pages of Dragon User. But if you have one of those printers for which nobody seems to have a screen dump, then MacGowan could be your answer!

Brian Cadge



Bubble Busters!

Program: Bubble Buster, Microsal, 41 Trinity Road, St. Austell, Cornwall, PL25 5JZ
Price: £1.99

THIS IS the second of two games that set you up at the bottom of the screen as a catcher trying to catch the falling objects. This is the version that works quite well.

The screen display is neat and clear, with the multi levelled catcher at the bottom and the bubbles lined up at the top ready to fall.

Play commences nicely and the movement of the catcher is a very good form of proportionality. Proportional movement means basically that the catcher or rocket or whatever your character in a game is will come to rest in a position directly proportional to the position of the joystick in its frame within the boundaries of the dimensions of movement of the object.

Directional movement on the other hand allows you to direct a force onto the object to make it move in the direction shown (however not all games obey the laws of physics — some objects tend to stop after the force is released).

This game has proportional movement but does not jump from position to position; a character instead to glide, covering all intermediate points making control more precise if slower.

Sadly, however, this is not a good game — it just hasn't got what it takes. It is not challenging enough, and has so sophistication.

Another area for the growing EEG mountain of null games.

Jason Choum



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

Dragon Answers

basic, but it does the job.

OM error

I HAVE had my Dragon 32 for 13 months now and am very pleased with it.

But lately when trying to load some games in, the computer comes up with OM ERROR. If I type in PRIME ROM when first switching the computer on, it comes up with 0487.

The games are brand new and have no faults in them. I have tried waiting for the powerpack to heat up before loading anything, but it still comes up with 0487 instead of 24008.

J Ryder
Clyton
Southwicks

When switched on, part of the initialisation routine tries to work out how much memory you have in the computer. It does not just assume 32K. It does this by trying to change the value in each location, until it comes to one which cannot be changed. This is assumed to be the end of RAM (currently 32768 — ROM).

If your Dragon reports only 0487 free bytes or less, then the problem is at least one faulty ROM byte, and the only answer is to consult a qualified Dragon engineer. I suggest you consult the pages at Dragon User to find the one nearest you.

Listings

MY DRAGON 64 is a fairly recent acquisition which is providing some interesting and irritating features.

I often wish to visually check a long listing. This has proved to be difficult as the program lists at such a rapid speed. How can it be slowed down?

Peter F Capper
48 Cavendish Drive
Pomfret
West Yorkshire WF9 2LZ

THE COMMONLY used 'quick and dirty' method to slow down the listing speed is to press 308,18 and still it still too fast then add PORE 308,18 as well.

These poles add a SYNC instruction in the Print routine which causes the processor to wait until the next interrupt occurs. The speed can be reset by poking the value 07 into these locations. Don't use these poles with Dragonoids or cartridges such as WREDS attached.

Acid test

I HAVE written a basic program for my son, who is a chemistry student, to determine the chemical term pH.

I am, however, unable to express all of the number in a base 10 — is to determine the Log10.

Is there a simple function on my Dragon which will do this, or is there a mathematical expression which I can put into a DFY function?

J S Papington
24 Kingsley Road
Northampton NN2 7BL

THE DRAGON has no built in function for calculating logarithms in the base 10; the LOG function works in the base 'e'.

The following user defined function can be used to return the base 10 logarithm of a value: $10 \text{ DEF FNL (X)} = \text{LOG (X)/LOG (10)}$

The function is used within the program as follows:

100 Y=FNL (X); REM Y equals the base 10 log of X

64 mode

I HAVE owned a Dragon 32 for some time, but I have recently upgraded it for a 64. Every game I have has loaded into my new machine perfectly, until I tried to load a machine-code routine in '64 mode' (by typing 'X32C 48000' beforehand). The game loaded immediately, but stuck on the title screen. At first, I thought that the fault was in the game, but after trying with several other games, I diagnosed that the fault was in the computer. As the manual says that only cartridges will not work in '64 mode', please could you explain the fault, and maybe I may avoid it.

Thomas Carter
Tyn-y-Gar
Mamharill
Penygoel
Gwent NP4 2LS

THE POINT about the '64 mode' is that all the ROM routines are copied into RAM starting at 49152, rather than at the original ROM position of 32768. This gives you 148 of extra memory from Basic.

If a machine code program over ROM routines it will jump to the position where the routines would be in the '32 mode', but as the routine is no longer there



the program will crash. The idea behind the '32 mode' on the 64 was to make all software written for the 32 compatible.

As there is no advantage in using machine code programs written for the 32 in 64 mode — indeed they will probably crash — which is using the '32 mode' for these.

Bit in?

I AM currently writing a different sortload program to the Basic interpreter to test the probes. However, I am having trouble in putting the data to tape. What values do I have to code to GET30 when saving to indicate whether the bit is on or off? Do I have to poke any other address before saving, and will it be the same when I load it back in?

Both load and save programs are synchronised so data should not be lost during loading.

J Lally
38 Wyndham Road
Salisbury
Wiltshire SP1 3AB

THE VALUES that need to be put into GET30 are stored in the ROM between 38044 and 38050. For a zero bit each value is copied, for a one bit every other value is copied. The 'bit in' routine can be used to read the bit value back into the carry, and this starts at 40545.

Perhaps a better way to write your own cassette routines is to use the more reliable 'byte in' and 'byte in' routines, which start at 40448 and 40457 respectively. Both of these use the 3 registers.

Edge pins

I PRESENTLY own a Dragon 32 with a single disk drive operating under Dragonoids. I have the

opportunity of buying a second-hand drive. Could you tell me the pin connections from the Dragonoids cartridge to the drive?

S Garsatt
Wimborne

LOOKING down at the edge connector of the Dragonoids cartridge, the odd numbered lines are all on the upper side and are all ground. The even numbered lines are on the under side, with pin 2 in 34 running from right to left.

These lines are the standard 5in disk drive connections. You will need to know the following to use a second drive: 0—M002, 10—Drive 0, 12—Drive 1, 16—M0106, 18—DM01006, 20—DT1P, 22—WRITE DATA, 24—WRITE DATA, 26—TRACK 0, 28—WRITE PROTECT, 30—READ DATA, 32—S0001.

Line 34 is used by drives with a 'Ready' line, and is not connected on Dragonoids.

Put on

I AM having trouble with the GET and PUT instructions. Powerful as they are, I cannot find a way of PUTTING on to the screen and having the effect of an exclusive OR parameter. Can you please help.

J Samsen
Aickmanworth

UNFORTUNATELY, there is not an XOR option in the GET/PUT command, which is a shame as this would probably be the most useful of all. The nearest you can get is to GET the area of screen where your object is to be put into a temporary array, then PUT the object there using the OR option. Finally, to remove it PUT the original back from the temporary array using the PSET option. This is not as fast as a single XOR option would have

The only figures that count

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Competition Corner

Artwork in Competition Corner:
Dragon User 12/12 Little Herpet
Street, London WC2H 7PP.

CONSIDER the following program. Before reading further can you determine what it does? Allow yourself a time limit of one minute.

```
10 X=1:Y=1
20 PRINT X,Y
30 FOR N=1 TO 9
40 X=X+Y:PRINT X,
50 Y=X+Y:PRINT Y,
60 NEXT N
```

Full marks if you realised that the program generated the first ten numbers in the series: 1, 1, 2, 3, 5, 8, 13, 21, ... etc. Each successive number is found by adding together the preceding two numbers. The series so formed is called the 'Fibonacci' series after the man who first described it.

Fibonacci — the name means 'son of Bonacci' — was probably the greatest mathematician of the Middle Ages, and was the pioneer of the Arabic decimal system of numerical notation as opposed to the cumbersome Roman system still in use in Italy at that time. Born in Pisa in the twelfth century, he received his education in Algeria where the Arabic number system was in use. In 1202 he published his best-known work, *Libro Abaci*, which contained all that was then known about arithmetic and algebra.

His skill at solving difficult and complex mathematical problems was often demonstrated publicly. At that time it was the custom for the leading mathematicians to compete in tournaments (rather like the Top Snooker players and chess Grand Masters of the present day). So great was Fibonacci's reputation that a team led by Emperor Frederick II travelled to Pisa in 1225 to challenge Fibonacci to a contest. One of the questions solved by Fibonacci was: Find a square that remains a square if it is decreased or increased by five.

Obviously, the answer is not an integer, but it must be capable of being expressed in rational numbers (otherwise there would be an infinity of solutions).

Fibonacci found the number: 1681/144 or 41/12 squared.

If five is subtracted it becomes 1611/144



Gordon Lee solves the puzzle — Software Projects' Manic Minor is the prize

or 20/12 squared; if five is added it becomes 2401/144 or 49/12 squared. It was fortunate that the difference given in the problem was five, as one, two, three, or four are incapable of solution!

Although Fibonacci was the first to describe the series, he did not investigate its properties in any depth, and it was the Frenchman Etienne Lucas who gave the series its name and examined it in detail during the last century.

It will be readily seen that the series is rapidly divergent, — that is, it gets larger very quickly. Edit line 30 of the program to: 30 FOR N = 1 TO 22 and it will be seen that the 45th number of the series causes a switch to exponential notation.

There are many curious properties relating to this series. For example, apart from the trivial case of 1, the only number in the series that is a perfect square is 144, and, obviously, this is the twelfth number in the

series. The only cubes in the series are 1 and 8. The square of any Fibonacci number is either one more or one less than the product of the preceding and following numbers. The sequence of final digits repeats in cycles of 60. Every third number in the series is divisible by 2, every fourth by 3, every fifth by 5, every sixth by 8, and so on, the divisors being themselves the Fibonacci series.

Perhaps the most surprising property can be shown if we again modify our program. Edit lines 40 and 50 as follows:

```
40 X=X+Y:PRINT X, 1/Y
50 Y=X+Y:PRINT Y, 1/X
```

This will now also print out the value of each number in the series divided by the number immediately below it. If the program is run it can be seen that this very rapidly converges to a value of 1.61803398... — the 'golden' number. This is a number which itself possesses many strange properties. It is the only positive number which becomes its own reciprocal by subtracting 1. Also a rectangle having sides in the ratio of 1 : 1.61803398... is said to be particularly aesthetically pleasing to look at, and is a ratio which is found in much classical art and architecture. If a sheet of paper with sides in this ratio is divided by a straight cut across its width so that the piece removed is exactly square, the remaining piece will also have sides in the same ratio, and so the process can, at least in theory, be continued ad infinitum.

As well as the Fibonacci series so far considered, an infinity of quasi-Fibonacci series can also be generated using any two positive integers as starting values. For example Edouard Lucas used the starting numbers 1 and 9 to generate the series: 1, 3, 4, 7, 11, 18, ... etc.

In order to jump on this band-wagon I have devised the 'Lee' series. Unlike the Fibonacci or Lucas series it is totally unremarkable except for one thing. The two starting numbers are the lowest possible that will produce, somewhere within the series, a value of one million.

This month's competition is to determine these two start values.

Prize

THIS MONTH, 20 copies of Manic Minor, the classic arcade game, can be won — courtesy of Software Projects.

Rules

TO WIN a copy of Manic Minor, you must first solve the answer to the competition, and, secondly, demonstrate how you solved it with the use of a Basic program written on your Dragon.

Please do not send in a cassette containing your answer.

Make sure your name and address are clearly printed on your entry and mark the envelope October competi-

tion. Envelopes which do not say which month you are entering for will be disqualified.

As a Fibonacci, complete the following sentence in 10 words or less: "Manic Minor is the game for me because..."

Entries must reach Dragon User by the last working day in October. The winners will be announced in the January 1985 issue. The editor's decision is final and no correspondence will be entered into.

July Winners

THIRTY lucky — or skilled — Dragon User readers have won themselves copies of Roman's Revenge

from Design Design.

They are B Taylor of Unstead, Terry Porter of Chisleton, Andrew Carnell of Cleveland, P Jameson of Stockton-on-Tees, S Chamberlain of Banbury, P Matthews of Bognor Regis, Jon Collins of Langley Village, Mike Evans of Hadleigh, J Layland of Banxton, S Holt of Buscup, P Bennington of Strood, R Wilson of Beeston, P Taylor of Askeham, M Edwards of Welwyn Garden City, S Clayton of Bessacott, R Hasted of Sirm, R Woods of Mord, Walter Schmitt at Pottersham, J Isherwood of Newquay and K Townsend of Alton.

The answer, by the way, was 55555.

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