

DRAGON USER



The independent Dragon magazine

July 1986

Contents



Editorial

Letters

2

Air your opinions about the whole Dragon world, before the eyes of thousands.

People's Chart

3

Find out which program everyone else is buying — and send in your top five — you could win £25!

News

4

The future of your Dragon — we ask the experts — tidy your computer — 6809 convention revealed.

Communication

5

We don't have all the answers — but you might find someone who does in our problem-solving column.



Dragonsoft

6

Three new games for Microdeal — you read it first in this issue!

Canoe

7

Machine code arcade action — paddle your way to victory in this game.

Disc Drives

12

Are you thinking of upgrading to a Disc Drive? Read this first — it contains some invaluable advice.

Dragon Answers

14

Brian Cadge collects his usual assortment of waifs and strays and puts them back on the straight and narrow.

Journey Planner

15

Here's a useful program for the summer holidays — plan your car journeys on your Dragon. Try it and see!

Graphics

18

Peter Whittaker wasn't satisfied with his Touchmaster Graphics software — so he wrote his own. This is it!

Arcade Arena

24

Who is this man? What is his name? How much are we paying him!? This month, finally a Jet Set Willy map.

Adventure Trail

26

Mike Gerrard time again — with his usual batch of news and help for stranded adventurers.

Competition

30

Stretch your brain — with this month's poser set by Gordon Lee. How does he do it?

WELCOME to the new Dragon User, By Subscription Only. DU's regulars are the heart of the Dragon community in Britain, with many nerves and arteries reaching overseas to Europe and beyond.

Gamesplayers, serious programmers, and users experimenting with system design and communications have found the Dragon (which is the only popular 6809 machine in the UK) a powerful and versatile tool and a good companion. Good enough to stick with despite the competition.

Now the Dragon world needs to stick together, keep the news circulating and ideas developing. Write to us about your User Group; show your copy of Dragon User to other Dragon owners, who may have missed their chance to subscribe through lack of foresight (or funds), so that they know that Dragon's own forum is still going strong.

Remember — if you want to subscribe, nothing could be easier. Send off £14 (in the UK) or £20 (overseas) to Dragon User, 12-13 Little Newport Street, London WC2 for 12 issues.

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Subscriptions
UK £14 for 12 issues
Overseas (surface) £20 for 12 issues
ISSN 0265-0177. Telex: 296275
Dragon User, 12/13 Little Newport Street,
London WC2H 7PP
US address: c/o Business Press
International, 205 East 42nd St, New York,
NY 10017
Published by Sunshine Books, Scot Press
Ltd. ©Sunshine Books 1986
Typesetting by Chesham Press, Chesham,
Bucks.
Registered at the Post Office as a newspaper
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How to submit articles

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

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

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

Puzzle Query

I AM an avid fan of your competition page. Most of us realise we have only a small chance of winning, but because we have taken time and trouble to complete the programs we would like to know the correct result and method to be used. Not just those who send in entries — after all, they have some idea. Others may be baffled but interested — why not give them the pleasure of learning from the correct method?

Denis O'Mulloy
23 Swaynes Lane
Comberton
Cambs CB3 7EF

If we get enough demand for this, we will . . . but what should we drop to make the space?

Please don't feel neglected if you send an SAE but don't get a reply. DU doesn't support enough editors to write personally to all our readers — so we concentrate on urgent queries — where we are able to find an answer, that is. A good form of support is for readers to send us any information about problem-solving, or software news.

Screen Change

IN ANSWER to Alan Green's letter (*Dragon User* Dec. 85) the program listed at the bottom of the page will convert the text screen to green on black. The CLS command is also updated but the CLEAR key and the RESET button will result in a green screen.

Has anybody had any luck with Splitz? I've carefully entered the program using several methods but each time I just get an irritating flicker.

```
10 CLEAR200, 32539
20 FORI=32540 TO 32635:
  READA$
30 POKEI, VAL ("&H" +
  A$):NEXT
40 FORI=0 TO 127: PRINT
```

```
@ 0.CHR$(I);
50 POKEI + 32637, PEEK
  (1024): NEXT
60 POKE 359, 126: POKE
  360, 127
70 POKE 361, 28: POKE
  416, 126
80 POKE 417, 127: POKE
  418, 109
90 CLS
100 DATA 32, 62, 34, 36, 9E,
  88, 81, 8, 26, D, 8C, 4, 0,
  27, 35, 86, 20
110 DATA A7, 84, A7, 82, 26,
  15, 81, D, 26, 4, 8D, 29,
  20, D, 4D, 2B
120 DATA 8, 10, 8E, 7F, 7D,
  A6, A6, 88, 40, A7, 80,
  9F, 88, 8C, 5
130 DATA FF, 23, 11, 8E, 4,
  0, EC, 88, 20, ED, 81,
  8C, 5, EO, 25
140 DATA F6, 9F, 88, 8D, 2,
  35, B6, 86, 20, A7, 80,
  1F, 10, C4
150 DATA 1F, 26, F6, 39, 2F,
  1, 39, 35, 10, 8C, BA, 62,
  26
160 DATA F8, C6, 20, 7E,
  BA, 79
```

Paul Burgin
18 Moorcroft Road
Sheffield
S10 4GS

Tandy club

FIRSTLY, THANKS for an excellent mag. It is nice to know someone still cares. I own a Tandy CoCo 64K. I have had it for 2½ years, and have been buying your mag all that time.

Now the complaint. How come the CoCo rarely gets a mention? At least half (if not more) of your readers are Tandy owners. So please don't forget us.

Secondly — come on you programmers, don't forget us either. How about writing your programs for the CoCo as well as the Dragon. I know Blaby and Microdeal have, but that is about all.

Thirdly, I would like to start a CoCo/Dragon Users' Club in the Basildon area, to swap programs, ideas, etc. Anyone interested please contact me at the address as shown.

Once again *Dragon User* keep up the good work.

Mr S. R. Kilcoin
187 Spurriers
Laindon
Essex SS15 5NG

Monitor Bug

THANK YOU for publishing my MONITOR program. Unfortunately there is a bug in the program so that the Kopy routine will only work on the graphics pages. To fix the routine, use the <A> iter routine to poke a &H12 into memory locations &HOE74 to &HOE7E. Sorry for any inconvenience this may have caused people.

Peter Whittaker
73 Norwich Street
Cambridge
CB2 1ND

Nice one Roy!

I AM WRITING to compliment Roy Coates on his Jet Set Willy. All the Spectrum owners (one of them anyway) is as sick as a dog because of the seven screens (at the last count) more than the Spectrum's. I keep rubbing it into the cuts in his fingers (from the keyboard).

All in all the game is great and his new game, *Bean Stalker*, looks just as good and this just goes to show the Dragon is far from dead and if you ask me it's more alive than ever. Like what N. T. Butlers said in his letter to the software companies, "You support us, and we will support you."

P.S. I think the *Dragon User* does a lot for the Dragon. Keep up the good work.

J. Elvidge
22 Carlton Avenue
Cheadle Hulme
Cheshire
SK8 5EH

Hacking Mad

ONE PROGRAM I have been trying to hack for the past few months I am glad to say I have finished. The following few pokes, if typed before executing Madness and the Minotaur,

give the score command an extra facility. Instead of printing your strength it will reset your strength to its maximum. This has advantages if you get very weak from, say, being molested by *creatures*, or if you need to make a vital jump.

```
POKE 9613,134
POKE 9614,255
POKE 9615,151
POKE 9616,5
```

```
POKE 8728, (0 to 240 in steps
of 5 — maximum number
of points required)
```

```
or
machine code
LDA 255
STA $05
```

Simon Hargrave
Crawley Hill Farm
Uley
Dursley
Glos
GL11 5BH

Holy Days

I HAVE BEEN doing a fair amount of research into the Yorkshire Parish Records. All of them give 1750, March 24th/25th, as the change date. (See T. Bottomley's letter, May 1986.)

The writers were there at the time and so must be in a good position to know. (*I wouldn't put it any more strongly than that.* — Ed.)

Apropos of nothing, can anybody tell me when Xmas day was first celebrated as a holiday, as several of my ancestors have been baptised, married and even buried on 25th December.

Denis Greswolde
12 Fairfax Crescent
Southowram
Halifax HX3 9SQ

Apology

The 'Blockbuster' ad. should not have appeared in the May issue. Our sincere apologies to anyone who was inconvenienced by this mix-up, not least to Microdeal themselves.

Dragon User People's Chart

SHOCK success at the Dragon User People's Chart, as Microdeal's Shocktrooper again establishes itself at number one, narrowly beating Juxtaposition.

Much ingenuity appeared in this month's anagrams, although no one has actually scored with that elusive x-factor yet. Honourable mentions go to Keith Turner for his show slogan 'Race to Osset, spend coppers' and to D. I. Green for his sentiment 'What do dragons like to eat? Lots of chips!' Dishonourable mention goes to Stephen Smith, whom delicacy and our legal department forbids us from quoting, but thanks for the chuckle, Stephen. This month's prize goes to Jonathan Fisher of Huddersfield for stating the obvious 'Top three games lost in here', and getting it right, too!

Each month we will be asking you to vote for your top five favourite programs on your Dragon at the moment — games, applications or utilities. Either list them on the form opposite or, if you don't want to damage your Dragon User, just copy them out. To add that frisson of excitement (as if you weren't excited enough already) we will award £25 worth of Microdeal software to the voter who comes up with the slogan which tickles us most. Make up the slogan from letters from your own top three titles (you don't have to use all the letters). You can vote, of course, without sending a slogan — but you won't be in line for the prize. So write, right?

Results May 1986

- 1 Shocktrooper (Microdeal)
- 2 Juxtaposition (Wintersoft)
- 3 Shaolin Master..... (Quickbeam)
- 4 Speed Racer (Microdeal)
- 5 Eddie Steady Go (Incentive)

Chart Six

Voting for Chart No. 6 closes at 1pm on Friday, 18th July, 1986. Entries received after that time will not be eligible for inclusion in that month's voting. The editor's decision is final. Only one entry per individual per month will be allowed.

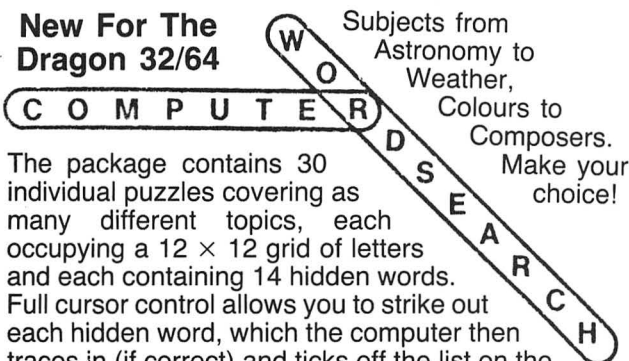
My top 5: Voting Month 6

	Name
1.....	Address.....
2.....
3.....
4.....
5.....

My phrase is:

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Your Dragon — The Future

NOW THAT *Dragon User* is appearing in its exclusive newsletter form, we asked some of the Dragon's staunchest supporters how they saw their future with the beast. Will the 50,000 Dragon-keepers in *Dragon User's* regular and occasional audience, provide enough enthusiasts to prevent this respected but beleaguered machine from falling below critical population levels as a commercial proposition?

Compusense's Ted Opyrchal hit the nail on the head. "We're still making money out of the Dragon. We're keen on seeing it survive. It's the only popular 6809 machine in the UK, and its strengthened our position in schools and colleges, so we shall continue to support it for as long as we can.

"But we're for serious users at the upper end of the market now. I think games players will be less well served. We've sold hundreds of Dragon Plus cards at £100 a card, but I can't see where else we can go after the Dragon Plus. I can't see the Hard Disk Drives becoming

truly popular until hard disk prices come down, which is some way in the future.

"There's going to be a spares shortage. We've run out of replacement transformers — there are no more, so tell everyone to make sure all their leads are properly earthed, and the connectors in the right way round. We lose money on repairs, and now we are running out of parts."

Has he heard from Eurohard in Spain?

"They've closed their Madrid premises and withdrawn to their factory. I've had a 1986 price list, but importing prices just are not economic. I can't get through to anyone there. But it's not all that gloomy — the Dragon has been around for two years longer than anyone predicted, and we're going on with it."

John Bailiss of Blaby Software, and Jenny Pope of Microdeal were both emphatic that, despite Ted Opyrchal's predictions, they had plenty of new games coming along, and *Dragon User* subscribers



would be hearing about them pre-release as usual. "I've been telling people that *Dragon User* won't be on the news-stands," said John. "Some of them are a bit perplexed about what's happening." All is explained on this month's front page. Jenny reminds everyone again that Microdeal are organising the 6809 Show at the Royal Horticultural Halls in Victoria, London, on 22nd November. More information from Microdeal on 0726 68020.

Less happy news came from Melbourne House — especially for *Dragon User* prizewinners in the April contest. Melbourne have used up their stocks of *Enter the Dragon*, and won't be reissuing the

game. But they hope to retrieve some copies for the remaining winners.

Problem-stricken company Eclipse/Fenmar Ltd are still struggling to sort out their backlog of customers with *Total Eclipse* problems, according to the Birmingham Consumer Service. Some users have received replacement games, but are still having trouble with the program. "The company simply ran into difficulties which it didn't foresee," says the man from the BCC. What a tragic end to a good idea.

Practical Programs

PRACTICAL programs for small businesses are the new speciality of Warrington software publishers Buzz Software. They are offering an information pack on their software, plus a discount of £1.50 on the S.B. packages, until 31st July, 1986. Most of the S.B. range can use one another's data files, and are priced at £5.

For information send a 17p stamp or SAE to: Simon Goodwin, Buzz Software, 15 St Stephen Road, Penketh, Nr Warrington, Cheshire WA5 2AN.

Convention Report

THE FIRST 6809 convention was held on Saturday and Sunday the 5th and 6th of April in the entrance hall of the Umist buildings in Manchester. Most of the regular exhibitors were present, and several guest speakers were invited.

The speeches on Saturday included a very highbrow talk by Stan Opyrchal of Compusense on the values of Flex against OS-9, a very well-received talk on programming techniques from Gordon Twist (who, incidentally, runs a cheap and efficient repair and upgrade service (on 050-982 3722), and an absolutely excellent speech by Keith Rose of Modem House.

Sunday arrived under an atmosphere of disappointment from the companies who, on the whole (ie, apart really from Microdeal) were not selling as much as they had hoped. Most of them said that they

would attend the next convention, but that they could sell more in one day in London than in two north of Watford, in a nutshell.

The show's atmosphere was in its element when the floor was opened to general discussion and a very obvious spirit of co-operation in a difficult situation (as undeniably is that of the Dragon) could be seen.

Two awards were presented, the Broken Dongle to an embarrassed Roy Coates, and the Program of the Year award, which was given to Microdeal, rather unsurprisingly, for *Shocktrooper*.

And that was it. Disillusionment for the companies, but for the crowd a communal enjoyment.

I thought this convention was an improvement on the previous shows and would like to see it in London, soon . . . but if you disagree, you know the address.

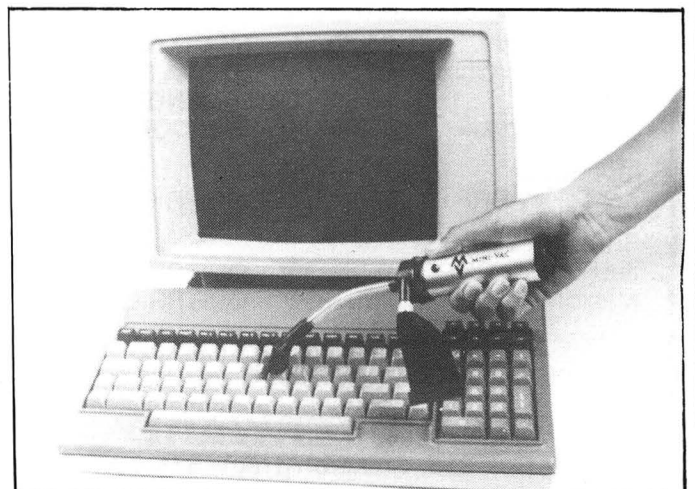
J.O.

Suck it and see

'HOUSEKEEPING' is all part of a programmer's routine. Now there is a Mini-vacuum cleaner to help out with house-keeping of the traditional kind, in and around the hardware. The battery-operated Mini-Vac will either suck up dust and fluff into its bag, or blow loose dirt

away. There is a choice of straight or curved vacuum pipe, and all-purpose or lens-quality brush. Useful for anyone who does repairs or other inside work.

Mini-Vac costs £11.95, including VAT and postage, from Authenticity, PO Box 34E, Worcester Park, Surrey KT4 7YH, or from specialist and hardware stores.



Underwater

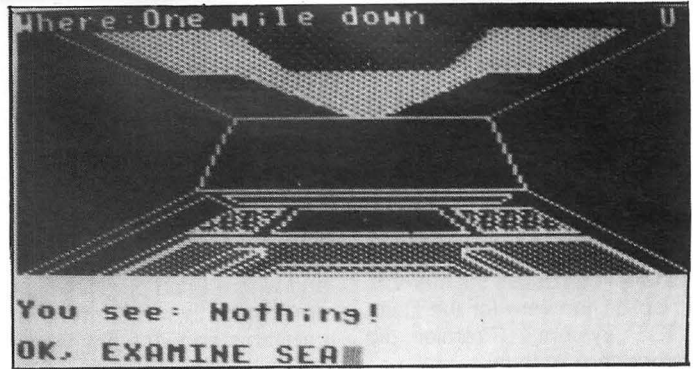
Program: Aquanaut 471
Supplier: Microdeal
Price: £5.95

THE first of the three new Microdeal releases under the axe this issue is this adventure which is set underwater. The game starts on the ocean surface; you dive and start hunting around when your craft is rocked by an underwater explosion. You go off to investigate and find yourself in an underwater complex trying to save the place from a watery demise.

Bearing in mind that you're doing them a favour, the security forces are particularly unhelpful, indeed there are two sets of them and if you're not very quick on the joystick you'll

get sent back to the entrance again!

I say quick on the joystick because this is a most unusual adventure in many ways. The graphics (the game is split screen — top half for graphics, bottom half for text) are very unusual in their style although they do have a certain clarity after the player is accustomed to them. The game runs like an adventure, with the very useful facility of being able to move with the arrow keys (a la Sysgy) but suddenly on arrival at certain locations the player is required to play a very simple arcade game to progress. No doubt this will annoy some people but I found it refreshing and the games have the advantage of being solvable; once a game has been completed there is very little problem in doing it again and



again first time.

The adventure is not particularly difficult to solve but is very good fun to play. Especially pleasing is the section involving finding a robot called Huey! It's a couple of afternoons relaxed thought to solve this one and I can recommend it as an introduction to adventuring (and Map-making, as it's fairly straightforward).

This is the sort of adventure I could quite easily play while sunbathing! It has that really nice relaxed edge which comes from it being set in an original environment. As you may have guessed, I like it.

Jason Orbaum



Timely

Program: The Vortex Factor
Supplier: Microdeal
Price: £5.95

THIS is the other new adventure from Microdeal and is by the Trekboer team which stands as an indication of its quality. Where Trekboer was about space travel, this one concerns itself with time travel and is, again, a very good game.

I haven't finished it, would you believe I need a light! Yep, that old chestnut of a problem is in there, and I can't find a solution to it, yet. It's harder than Aquanaut, about the same standard of difficulty as Trekboer in fact, so if that was your level you'll enjoy this one.

most of the stuff you need to get started. To give a lift to those stuck right at the start try closing doors behind you and also studying a bit of Physics!

The format is standard graphics at the top (with some objects pictured) and text beneath, the vocabulary fine and the keyboard response very good.

There is no HELP option but the SAVE and LOAD work very reliably. However, there is a problem with the adventure, due to what I can only assume are its American origins. By

stating the problem I could be accused of giving a big clue to the adventure but it is unfair that one of the key objects cannot be reached until it is realised that in numerals the Americans write their dates month, then day, then year, ie 17/05/86 would be 05/17/86 in American format. I hope I haven't spoiled a part of the adventure for those struggling but I was, to be quite honest, well annoyed when I finally cracked it as I feel that an adventure should have everything within it necessary to

solve it and should not rely on pieces of trivia. For the solution to the problem in question I'd like to publicly thank a friend of mine although I have no idea how he knew about it.

To sum up then, another good adventure, marred only by the above mentioned problem, and one to which I shall be returning until I finish it. I hope this team produce more adventures, and soon!

Jason Orbaum



Mountains

Program: Rommel 3-D
Supplier: Microdeal
Price: £5.95

IF THERE'S a sort of game I love reviewing above any other it's arcade copies. The thing is, everyone *knows* what sort of game they are, all I have to say is "Battlezone" or "Rommel's Revenge" and I've saved myself two paragraphs of copy describing the game, and all that remains is to comment on its quality as a copy, and give it a rating.

At the 6809 convention John Symes said to me that this game was simply better than "Rommel's Revenge" and he said if it wasn't he wouldn't have put it out.

The trouble is, I don't think it

actually is better than "Rommel's Revenge". Yes, it's faster, and yes there are mountains (one of my gripes at the former was for its lack of mountains) but the game simply doesn't have the right feel of the original and "Rommel's Revenge" has it.

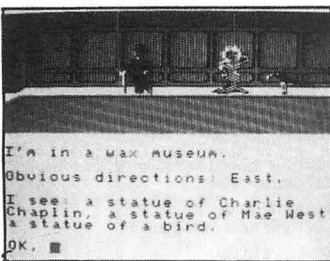
Rommel 3-D is more refined and is by any standard a good game; it offers a choice of colours — yes, you can play this one green on black! — and the sound is slightly better. The problem is it's too fast. It has turned what was originally a tactical battle game on a field, a tense session of guerrilla seek and destroy, into a wham-bam-slam all moving game.

The game also fails to provide all of the enemies of the arcade. It offers tanks, planes and super tanks. I don't know if the planes are the missiles or

saucers of the original as I've never lasted long enough to see one — the game is damn fast and the tanks are deadly! No doubt The Expert has blasted his way into the millions on it by now and will inform us all through his next column what they are. (Incidentally, word has reached me that someone thinks I am The Expert, can I state here and now that the day my english degenerates to his level I shall pack up writing altogether!)

So, the game is good, and if you find "Rommel's Revenge" boring this could be the version you want but if you want a precise copy of the arcade game this isn't the one!

Jason Orbaum



The game starts with you in a mansion full of interesting exhibits, a quick scout round, examining everything (more than once as has now become a tradition) and you'll have

Down The River

M Croucher creates a canoe challenge.

NOTHING like paddling about in boats. And *Canoe* is ... an ideal trip on a wet afternoon. You don't have to unpack your kayak, just type in the BASIC loader and hex listings, load and launch.

First, enter the BASIC hex loader, and when complete, type RUN to begin.

The data is split up into eight blocks, and displayed on screen is the block number and address. Type in the relevant line of data and the commas will be displayed after every two digits have been entered, so there is no need to enter them separately. The last number is a check sum and this should be entered after the ? prompt. If an error has occurred then the address will be displayed again and the line of data will need to be re-entered.

When all the data has been entered the program will be saved to tape, ready for you to use. A copy on tape is available from M. Croucher, 14 Hillingbury Road, Prospect Farm, Havant, Hants PO9 5SE, price £2, if eight blocks of data seems like a lot of typing.

Use CLOADM to load the program. Once loaded, type EXEC to start the game. You have a choice of red or green canoes. For users with black and white TVs, a green canoe only is recommended.

The objective is to paddle your canoe as

fast as possible, trying to get through the gates without touching the marker flags. If you reach the finish line in the time allowed you can proceed to tackle the second river. on this river, beware of the banks and rocks as these will sink your canoe. You have three canoes to travel as far as possible.

A bonus point is awarded for each gate successfully negotiated, but all bonus points are lost if a flag is hit.

The right joystick is used to control the canoe. Moving it from right to left will move the canoe forward. Trying to paddle too fast will result in the canoeist getting tired, and the canoe will go out of control.

The time allowed, and the distance between the gates can be changed with the following pokes:

POKE &H3111,No

POKE &H43A7,No

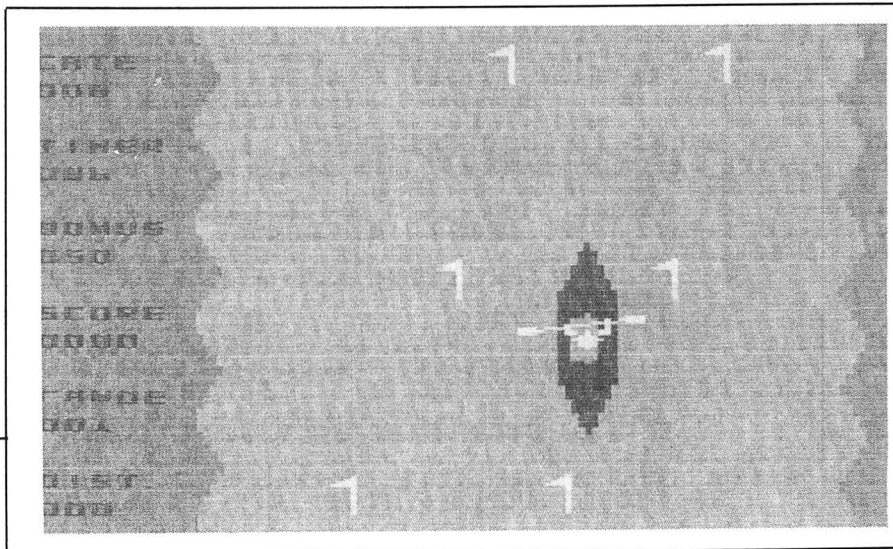
Where No is the distance required between the flags. $0 < \text{No} < 128$. Default setting is 64.

POKE &H4725,No

POKE &H472A,No1

Where No and No1 are the first two digits of the time required. Default setting No=1, No1=2.

Once finished, press any key to start a new game.



```
10 PCLEAR 1
20 CLEAR 200,&H23FF
30 FOR BL=1 TO 8
40 READ ST,EN
50 CLS:PRINT "          HEX LOADER":PRINT "--CANOE-- BLOCK";BL
60 FOR ADD= ST TO EN STEP 10
70 PRINT HEX$(ADD):CO=0
80 FOR XX= 0 TO 9
90 GOSUB 200:POKE ADD+XX,VAL("&H"+B#)
100 CO=CO+VAL("&H"+B#)
110 PRINT ",,":NEXT:PRINT:INPUT A#
120 IF VAL("&H"+A#)<>CO THEN SOUND 200,3:PRINT "--ERROR-- REDO!":GOTO 70
130 NEXT:NEXT
140 CLS:PRINT "SET UP CASSETTE AND PRESS ANY KEY"
150 IF INKEY#="" THEN 150
160 CLS:PRINT "NOW SAVING CANOE!"
170 CSAVEM"CANOE",&H2400,&H5018,&H4A00
180 PRINT :PRINT "CANOE SAVED BYE"
190 END
200 A#=INKEY#:IF A#="" THEN 200
210 IF (A#>"9" AND A#<"A") OR (A#<"0" OR A#>"F") THEN 200
220 PRINT A#;:B#=A#
230 A#=INKEY#:IF A#="" THEN 230
240 IF (A#>"9" AND A#<"A") OR (A#<"0" OR A#>"F") THEN 230
250 B#=B#+A#
260 PRINT A#;
270 RETURN
280 DATA &H2400,&H2F2E,&H3000,&H3805,&H3A00,&H3D2B,&H4000,&H41AF,&H4300,
&H4723,&H4A00,&H4C98,&H4D00,&H4EB8,&H4F00,&H5017
```

Data Block 1

2400	BE,0C,00,86,AA,A7,80,8C,24,00,3A1	27B6	AD,66,5E,AA,00,BE,2F,FE,10,BE,4A4	2B76	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
240A	2D,F9,4F,8E,0C,1F,A7,84,30,88,411	27C0	27,D3,EC,A1,4D,26,01,39,ED,B1,4A2	2B80	A0,00,00,00,00,00,00,00,00,00,A0
2414	20,8C,24,00,2D,F6,8E,0C,00,A7,334	27CA	A6,A0,A7,84,30,88,1E,20,EF,AA,500	2B8A	00,00,00,00,00,00,00,00,00,00,0
241E	84,A7,01,A7,02,A7,03,A7,04,30,35A	27D4	AE,AA,AA,AE,AA,AA,AE,AA,AA,BF,6C5	2B94	00,00,00,00,00,00,00,00,00,00,0
2428	88,20,8C,24,00,2D,EE,86,0C,34,3ED	27DE	AA,AA,BF,AA,AA,BF,AA,AA,BF,AA,6E3	2B9E	00,00,FF,FF,FF,FF,FF,FF,FF,FF,7F8
2432	02,7F,33,79,17,05,88,35,02,4A,252	27E8	AA,BF,AA,AA,FF,EA,AA,FF,EA,AA,7E3	2BAB	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
243C	26,F3,B7,FF,C6,B7,FF,C9,B7,FF,7CA	27F2	FF,EA,AA,FF,EA,AA,FF,EA,FF,8B9	2BB2	FF,FF,FF,FF,00,00,00,00,00,00,3FC
2446	CB,B7,FF,CC,B7,FF,CE,B7,FF,DO,857	27FC	FA,AB,FF,FA,AB,FF,FA,AB,FF,FA,8E6	2BC6	00,00,00,00,00,00,00,00,00,00,0
2450	B7,FF,D2,87,FF,D4,B7,FF,CO,B7,83F	2806	AF,FF,FE,AF,FF,FE,AF,FF,FE,AF,8B3	2BD0	00,00,00,00,00,00,00,00,00,00,0
245A	FF,C3,B7,FF,C5,86,E0,B7,FF,22,77B	2810	FF,FE,AF,FF,FE,AF,FF,FE,AF,FF,903	2BD4	00,00,00,00,00,00,FF,FF,FF,FF,3FC
2464	1A,10,8E,28,FC,BF,01,0D,8E,12,349	281A	FE,AF,FF,FE,AF,FB,FE,AF,AA,FE,8A9	2BE4	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
246E	40,10,8E,25,85,EC,A1,ED,84,EC,572	2824	AF,AA,FE,AF,AA,FE,AF,AA,FE,AF,7B4	2BEE	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
2478	A1,ED,02,A6,A0,A7,04,30,88,20,459	282E	A6,FE,AF,A6,FE,AF,95,FE,AF,95,77D	2BF8	FF,FF,FF,FF,FF,FF,FF,FF,20,00,818
2482	A6,A4,26,ED,31,21,8E,0E,80,EC,487	2838	FE,AF,55,7E,AF,95,FE,AF,95,FE,704	2C02	00,00,00,00,00,00,00,00,00,00,0
248C	A1,ED,84,EC,A1,ED,02,30,88,20,566	2842	AF,A6,FE,AF,FE,AF,FE,AF,FE,AF,7B0	2C0C	00,00,00,00,00,00,00,00,00,00,0
2496	A6,A4,26,F1,31,21,8E,16,00,EC,443	284C	AA,FE,AF,AA,FE,AF,FB,FE,AF,FE,855	2C16	00,00,00,00,00,00,00,00,00,00,0
24A0	A1,ED,84,EC,A1,ED,02,A6,A0,A7,67B	2856	FE,AF,FF,FE,AF,FF,FE,AF,FF,FE,902	2C20	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
24AA	04,30,88,20,A6,A4,26,ED,31,21,38B	2860	AF,FF,FE,AF,FF,FE,AF,FF,FE,AF,8B3	2C2A	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
24B4	8E,19,0C,EC,A1,ED,84,EC,A1,ED,6DF	286A	FF,FE,AB,FF,FA,AB,FF,FA,AB,FF,8EF	2C34	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
24BE	02,A6,A0,A7,04,30,88,20,A6,A4,415	2874	FA,AB,FF,FA,AB,FF,FA,AA,FF,EA,8D5	2C3E	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,1FE
24C8	26,ED,31,21,8E,10,80,EC,A1,ED,50A	287E	AA,FF,EA,AA,FF,EA,AA,FF,EA,AA,863	2C48	00,00,00,00,00,00,00,00,00,00,0
24D2	84,EC,A1,ED,02,A6,A0,A7,04,30,521	2888	FF,EA,AA,BF,AA,AA,BF,AA,AA,BF,778	2C52	00,00,00,00,00,00,00,00,00,00,0
24DC	88,20,A6,A4,26,ED,31,21,8E,21,406	2892	AA,AA,BF,AA,AA,BF,AA,AA,AA,6D2	2C5C	00,00,00,00,FF,FF,FF,FF,FF,FF,5FA
24E6	40,EC,A1,ED,84,EC,A1,ED,02,A6,660	289C	AA,AE,AA,AA,AE,AA,AA,AA,AA,602	2C66	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
24F0	A0,A7,04,30,88,20,A6,A4,26,ED,480	28A6	BE,2F,FE,30,89,03,C3,86,56,A7,4ED	2C70	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
24FA	4F,8E,0F,CO,17,04,60,8E,0F,C1,385	28B0	84,A7,88,20,47,88,40,39,8E,2F,468	2C7A	FF,FF,FF,FF,FF,FF,20,00,00,00,61A
2504	4F,17,04,59,8E,0F,C2,4F,17,04,28C	28BA	FE,30,89,03,BF,86,56,A7,84,A7,527	2C84	00,00,00,00,00,00,00,00,00,00,0
250E	52,8E,17,04,4F,17,04,4B,8E,17,291	28C4	88,40,86,55,A7,01,A7,88,20,39,3D3	2C8E	00,00,00,00,00,00,00,00,00,00,0
2518	41,4F,17,04,44,8E,17,42,4F,17,23C	28CE	BE,2F,FE,30,01,86,AA,6C,4B,A7,501	2C98	00,00,00,00,00,00,00,00,FF,FF,1FE
2522	40,3D,8E,1B,00,4F,17,04,36,8E,21B	28D8	80,A7,80,A7,84,30,88,1E,5A,26,428	2CA2	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
252C	1B,01,4F,17,04,2F,8E,1B,02,4F,1AF	28E2	F4,39,BE,2F,FE,30,1F,86,AA,C6,55D	2CAC	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
2536	17,04,28,8E,1B,03,4F,17,04,21,17A	28EC	48,A7,80,A7,80,A7,84,30,88,1E,497	2CB6	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
2540	8E,1E,CO,4F,17,04,1A,8E,1E,C1,35D	28F6	5A,26,F4,39,FF,FF,7C,29,B6,B6,5BC	2CC0	00,00,00,00,00,00,00,00,00,00,0
254A	4F,17,04,13,8E,22,80,4F,17,04,217	2900	29,B6,81,32,10,26,00,B2,7F,29,322	2CCA	00,00,00,00,00,00,00,00,00,00,0
2554	0C,8E,22,81,4F,17,04,05,8E,22,25C	290A	B6,7D,29,87,27,05,7A,29,89,20,3BD	2CD4	00,00,00,00,00,00,00,00,00,00,0
255E	82,4F,17,03,FE,8E,13,82,4F,17,372	2914	1A,7D,29,88,27,0A,7A,29,88,86,38A	2CDE	00,00,FF,FF,FF,FF,FF,FF,FF,FF,7F8
2568	03,F7,86,01,8E,13,80,17,03,EF,3AB	291E	09,B7,29,89,20,0B,7A,29,87,86,3AD	2CEB	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
2572	8E,1E,C2,86,01,17,03,E7,86,02,37E	2928	09,B7,29,88,27,29,89,86,29,87,4D0	2CF2	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
257C	8E,13,81,17,03,DF,16,00,97,FC,3C4	2932	88,29,88,88,29,89,26,09,32,6C,406	2CF4	FF,FF,FF,FF,A0,00,00,00,00,00,49C
2586	30,CC,FC,FC,30,30,FC,CO,CC,30,60C	293C	8E,40,00,34,10,32,76,86,29,87,350	2D06	00,00,00,00,00,00,00,00,00,00,0
2590	30,FC,FC,FC,30,30,CC,CO,F0,30,630	2946	8E,13,80,17,00,15,B6,29,88,8E,372	2D10	00,00,00,00,00,00,00,00,00,00,0
259A	30,CC,FC,CC,00,FC,FC,FC,CO,774	2950	13,81,17,00,0C,B6,29,89,8E,13,2F0	2D1A	00,00,00,00,00,00,FF,FF,FF,FF,3FC
25A4	CC,30,CO,CO,FC,30,FC,CC,CO,66C	295A	82,17,00,03,16,00,59,10,8E,29,1D2	2D24	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
25AE	CO,FC,CC,30,FC,00,FC,FC,CC,CC,744	2964	84,C6,05,3D,31,A5,A6,A0,A7,84,4D3	2D2E	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
25B8	FC,CC,CC,FC,CC,CO,FC,FC,CC,82C	296E	A6,A0,A7,88,20,A6,A0,A7,88,40,54A	2D38	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
25C2	FC,CC,CC,FC,CC,CC,FC,FC,CC,82E	2978	A6,A0,A7,88,60,A6,A0,A7,89,00,54B	2D42	00,00,00,00,00,00,00,00,00,00,0
25CC	FC,CO,FC,FC,FC,FC,FC,CO,CC,834	2982	80,39,FC,CC,CC,CC,FC,30,30,5A5	2D4C	00,00,00,00,00,00,00,00,00,00,0
25D6	CC,CO,FC,CO,CC,FC,FC,CO,CC,744	298C	30,FC,FC,CO,FC,CO,FC,CO,FC,6F0	2D56	00,00,00,00,00,00,00,00,00,00,0
25E0	F0,CO,FC,FC,FC,FC,FC,CO,FC,864	2996	OC,FC,CO,F0,FC,30,30,FC,CO,FC,6CC	2D60	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
25EA	CC,FC,FC,CO,CC,FC,CC,CO,FC,894	29A0	OC,OC,FC,CO,FC,CC,FC,CC,FC,768	2D6A	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
25F4	FC,CC,FC,CO,CC,FC,CC,CO,FC,8A0	29AA	OC,OC,FC,01,02,00,B6,FF,02,3B,20D	2D74	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
25FE	CC,FC,FC,00,FC,30,FC,FC,CO,684	29BA	39,36,FB,16,06,3C,B6,2A,14,4C,302	2D7E	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,1FE
2608	30,CO,30,00,CC,30,FC,30,00,CC,414	29BE	B7,2A,14,81,0A,2E,01,39,7F,2A,291	2D88	00,00,00,00,00,00,00,00,00,00,0
2612	30,CO,30,00,FC,30,FC,30,CO,00,38A	29C8	14,B6,2A,12,8B,01,19,B7,2A,12,29E	2D92	00,00,00,00,00,00,00,00,00,00,0
261C	8E,1B,50,BF,2F,FE,17,01,96,17,3AA	29D2	B6,2A,13,89,00,19,87,2A,13,44,2CD	2D9C	00,00,00,00,FF,FF,FF,FF,FF,FF,5FA
2626	01,4F,8E,A0,00,01,26,FC,BE,38F	29DC	44,44,44,8E,22,80,17,FF,72,86,43A	2DA6	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
2630	2F,FE,30,89,FF,EO,BF,2F,FE,17,5CB	29E6	2A,13,84,0F,8E,22,81,17,FF,67,37E	2DB0	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
263A	01,7F,17,00,F4,8E,A0,00,30,01,2EA	29F0	B6,2A,12,44,44,44,44,8E,22,82,334	2DCA	00,00,00,00,00,00,00,00,00,00,0
2644	2F,FC,BE,2F,FE,30,89,FF,EO,BF,664	29FA	17,FF,5A,B6,2A,12,84,0F,8E,22,3A5	2DCE	00,00,00,00,00,00,00,00,00,00,0
264E	26,FE,8C,17,4C,2E,CD,1C,EF,17,439	2A04	83,16,FF,4F,00,00,00,B6,FF,23,3BF	2DD8	00,00,00,00,00,00,00,00,00,00,0
2658	03,E2,17,00,D6,17,02,58,86,03,2CC	2A0E	8A,08,B7,FF,23,86,02,1F,89,CA,465	2DE2	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
2662	B7,27,32,4F,87,28,FA,17,00,02,351	2A18	F0,F7,FF,20,C6,28,5A,26,FD,7F,5F0	2DEC	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
266C	20,FB,BD,80,12,B6,28,FA,4C,81,50F	2A22	BF,20,4A,26,EE,B6,FF,23,84,7F,5D0	2DF6	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
2676	80,26,0A,4F,87,28,FA,17,03,41,333	2A2C	08,B7,FF,23,86,3F,C6,AF,7F,FF,611	2E00	A0,00,00,00,00,00,00,00,00,00,A0
2680	B6,28,FA,87,28,FA,B6,01,5A,81,543	2A36	20,8E,02,FF,30,1F,26,FC,7F,FF,49E	2E0A	00,00,00,00,00,00,00,00,00,00,0
268A	06,2D,6F,81,3A,24,23,86,27,32,283	2A40	20,8E,02,FF,30,1F,26,FC,4A,26,390	2E14	00,00,00,00,00,00,00,00,00,00,0
2694	81,02,2D,01,39,4D,26,0C,17,00,1B0	2A4A	E7,B6,FF,23,84,F7,B7,FF,23,7E,691	2E1E	00,00,FF,FF,FF,FF,FF,FF,FF,FF,7F8
269E	94,17,02,16,86,03,B7,27,32,39,295	2A54	27,88,7C,2A,AA,B6,2A,AA,81,0A,447	2E28	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
26AB	17,00,CC,17,01,F8,B6,02,B7,27,359	2A5E	10,26,FB,87,7F,2A,AA,B6,FF,23,554	2E32	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
26B2	32,39,B6,27,32,81,02,24,01,39,25B	2A68	8A,08,B7,FF,23,8E,2A,AA,30,01,42C	2E3C	00,00,00,00,00,00,00,00,00,00,3FC
26BC	10,BE,2F,FE,31,A9,FF,FF,A6,A9,622	2A72	8C,88,00,26,03,8E,80,00,BF,2A,334	2E46	00,00,00,00,00,00,00,00,00,00,0
26C6	FF,FE,E6,A9,00,FE,84,CO,10,27,605	2A7C	AB,C6,10,A6,84,84,0F,87,20,511	2E50	00,00,00,00,00,00,FF,FF,FF,FF,3FC
26D0	00,00,C4,CO,10,27,00,07,17,01,1E7	2A86	23,7E,26,6E,80,00,00,17,FE,20,2EA	2E5A	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
26DA	F3,10,BF,2F,FE,17,00,D9,17,00,3F6	2A90	7F,27,32,10,BF,2F,FE,17,00,15,300	2E6E	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
26E4	92,7F,27,32,86,07,1F,89,4A,27,310	2A9A	16,0C,4E,2F,FE,26,86,01,7F,27,2DB	2E78	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
26EE	0C,5A,26,FD,34,02,17,03,1E,35,22C	2AA4	32,10,BF,2F,FE,17,04,36,16,0C,2A1	2E82	00,00,00,00,00,00,00,00,00,00,0
26F8	02,20,EF,39,B6,27,32,81,02,24,300	2AAE	3C,86,01,87,27,32,16,04,2B,00,218	2E8C	00,00,00,00,00,00,00,00,00,00,0
2702	01,39,10,BE,2F,FE,31,21,A6,24,351	2AB8	00,00,00,00,00,00,00,00,00,00,0	2E96	00,00,00,00,00,00,00,00,00,00,0
270C	E6,A9,00,E4,84,03,10,27,00,0D,33E	2AC2	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6	2EA0	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
2716	C4,03,10,27,00,07,17,01,C5,10,1F2	2ACC	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6	2EAA	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
2720	BF,2F,FE,17,00,95,17,00,0A,86,33F	2AD6	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6	2EBA	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
272A	01,87,27,32,17,FF,B7,39,01,8E,3D6	2AE0	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6	2EBE	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,1FE
2734	2F,FE,30,89,03,3F,10,8E,27,53,340	2AEA	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6	2EC8	00,00,00,00,00,00,00,00,00,00,0
273E	EC,A1,4D,26,01,39,ED,81,EC,A1,535	2AF4	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6	2ED2	00,00,00,00,00,00,00,00,00,00,0
2748	ED,81,A6,A0,A7,84,30,88,1C,20,4D3	2AFE	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6	2EDC	00,00,00,00,00,00,00,00,00,00,0
2752	EB,AA,AF,FB,FE,56,AA,AF,AA,DD,773	2B08	FF,FF,20,00,00,00,00,00,00,00,21E	2EE6	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
275C	56,AA,AF,A9,56,56,AA,AD,56,DE,58F	2B12	00,00,00,00,00,00,00,00,00,00,0	2EF0	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
2766	AA,A9,55,AA,DE,AA,96,AD,66,5E,5E1	2B1C	00,00,00,00,00,00,00,00,00,00,0	2EFA	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
2770	AA,AA,AD,66,5E,AA,00,BE,2F,FE,55A	2B26	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6	2F04	00,00,00,00,00,00,00,00,00,00,0
277A	30,89,03,3F,10,8E,27,97,EC,A1,3E4	2B30	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6	2F0E	00,00,00,00,00,00,00,00,00,00,0
2784	4D,26,01,39,ED,81,EC,A1,ED,81,516	2B3A	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6	2F18	00,00,00,00,00,00,00,00,FF,FF,1FE
278E	A6,A0,A7,84,30,88,1C,20,EB,95,4E5	2B44	00,00,00,00,00,00,00,00,00,00,0	2F22	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
2798	AF,FB,FE,AA,95,6D,AA,FE,AA,95,73B	2B4E	00,00,00,00,00,00,00,00,00,00,0	2F2C	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6
27A2	95,AA,FE,AA,AA,AD,55,DE,AA,AA,6C5	2B58	00,00,00,00,00,00,00,00,00,00,0		
27AC	AD,AA,56,AA,AA,AD,66,5D,6A,AA,585	2B62	FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,9F6		
		2B6C			

Data Block 4

4000 1A,10,10,BE,40,3A,8E,0C,2B,4F,256 408C AA,AA,AA,FF,AA,AA,FF,AA,FF,BA,7B3
400A E6,A0,E7,80,4C,B1,0E,2D,F7,30,51C 4096 AE,FF,AA,FF,AA,AA,FF,AA,FF,AA,AA,7A7
4014 8B,12,B6,40,39,4C,B7,40,39,81,3C6 40A0 FF,AA,FF,BA,AE,FF,AA,FF,AA,AA,80C
401E 14,2D,EB,17,01,2E,86,7D,B7,31,35A 40AA AA,FF,AA,AA,FF,AA,FF,AE,BA,FF,80C
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4032 09,7F,3B,09,16,03,0B,00,FF,FF,2EE 40BE FF,AE,BA,FF,AA,FF,FF,FF,AA,FF,8B6
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4064 FF,FF,FF,AA,FF,AA,FF,EA,AB,FF,8E3 40F0 AA,FF,AA,AA,AA,FF,AA,AA,FF,AA,7A3
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407B FF,BA,AE,FF,AA,FF,AA,AA,FF,80C 4104 AA,AA,FF,AA,FF,AB,EA,FF,AA,FF,839
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4118

Data Block 5

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432B 3B,86,3F,FF,44,44,44,44,8E,1B,3E5 4490 10,B3,45,58,2D,03,FD,45,58,B6,3E0
4332 02,17,E6,2B,B6,3F,FF,84,0F,8E,43F 449A 45,58,44,44,44,44,8E,14,4E,17,2B4
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4346 2A,12,B7,2A,13,B7,40,39,B7,29,340 44AE 17,01,68,B6,45,59,44,44,44,44,2E4
4350 B6,B7,29,B7,33,79,B7,33,7A,516 44BB 8E,14,52,17,01,5B,B6,45,59,84,33F
435A B7,33,7B,33,7C,B7,33,7D,B7,4E9 44C2 0F,8E,14,54,17,01,50,8E,1B,50,266
4364 33,8C,B7,33,91,B7,33,93,B7,33,4A1 44CC BF,2F,FE,4F,17,EA,30,8E,A0,00,49A
436E 94,B7,33,95,B7,33,96,4C,B7,37,4CD 44DE BD,80,06,26,4D,30,01,26,FC,BE,3C7
437B 5F,B7,29,B7,33,92,4C,B7,29,49E 44E0 2F,FE,30,8B,E0,BF,2F,FE,86,01,53B
4382 BB,8E,23,C5,BF,33,8D,8E,23,DE,53C 44EA 17,EA,16,8E,A0,00,BD,80,06,26,3AE
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43A0 B7,30,05,B7,30,8D,86,40,B7,31,40E 450B A0,00,30,01,26,FC,4F,17,E9,F1,433
43AA 11,B6,0C,B7,31,18,86,0E,B7,31,31F 4512 BD,80,06,26,11,8E,A0,00,30,01,2D9
43BA 64,86,B6,B7,31,31,86,33,B7,31,45A 451C 26,FC,86,01,17,E9,E0,BD,80,06,4CC
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43D2 33,7F,B7,33,80,B7,33,81,B7,33,471 453A C9,B7,FF,CA,B7,FF,CC,B7,FF,CE,84F
43DC 82,B7,33,83,B7,33,84,B7,33,85,4CC 4544 B7,FF,D0,B7,FF,C0,B7,FF,C2,B7,82B
43E6 B7,33,86,86,EC,B7,36,00,86,84,4D9 454E FF,C4,86,00,B7,FF,22,7E,47,24,50A
43FO B7,36,01,86,A3,B7,36,02,86,39,3C5 4558 00,00,0A,0A,0A,0A,0A,0A,0A,0A,17C
43FA B7,29,8E,86,16,B7,29,C1,86,EF,550 4562 AA,00,0A,00,0A,00,0A,00,0A,00,D2
4404 B7,26,56,4F,B7,26,D0,B7,26,D6,4E2 456C 0A,0A,0A,0A,0A,0A,0A,0A,0A,230
440E B7,27,14,B7,27,1A,86,0D,B7,26,35A 4576 00,0A,00,0A,00,0A,00,0A,00,0A,32
441B D1,B7,27,15,86,07,B7,26,D7,7,4BC 4580 AA,0A,A0,AA,0A,AA,0A,0A,AA,0A,2DA
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4436 30,8B,20,5C,C1,4B,2D,EE,8E,33,419 459E 0A,AA,0A,0A,0A,0A,0A,0A,00,0A,19A
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444A 86,AA,A7,AA,6F,80,6F,80,6F,80,54B 45B2 AA,0A,0A,00,0A,00,0A,00,0A,0A,17C
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4A2B 20,E9,30,01,20,E5,8E,05,62,10,344 4B04 00,00,00,00,01,00,00,00,01,00,2
4A32 BE,4A,9D,A6,A0,81,FF,27,04,A7,50D 4B0E 01,00,01,00,01,00,01,00,00,00,4
4A3C 80,20,F6,8E,05,82,A6,A0,81,FF,571 4B18 01,00,01,00,00,00,00,00,FF,01,102
4A46 27,04,A7,80,20,F6,8E,05,A2,A6,443 4B22 00,00,00,00,00,01,01,01,01,01,5
4A50 A0,81,FF,27,04,A7,80,20,F6,8E,545 4B2C 00,01,00,01,00,01,00,01,00,01,4
4A5A 80,06,27,FB,81,31,27,04,81,32,33B 4B36 00,01,00,01,01,01,01,01,00,FF,105
4A64 26,F3,8E,05,C2,E6,A0,C1,FF,27,5DB 4B40 01,00,00,00,00,00,01,00,00,00,2
4A6E 04,E7,80,20,F6,81,32,27,1E,8E,407 4B4A 01,00,01,00,01,00,01,00,01,00,5
4A7B 4B,C6,BF,27,C0,8E,4B,7E,BF,27,4F4 4B54 00,00,01,00,01,00,00,00,00,00,2
4A82 3C,8E,4B,A2,BF,27,80,8E,4D,00,3FB 4B5E FF,01,01,01,01,01,01,00,01,00,00,105
4A8C BF,3A,0B,8E,4F,00,BF,40,04,BD,3A1 4B68 00,01,00,01,00,01,01,01,00,01,6
4A96 80,06,27,FB,7E,47,24,44,4F,8F,3B3 4B72 01,01,01,01,00,01,01,01,01,01,9
4AA0 59,4F,55,8F,57,41,4E,54,8F,41,396 4B7C 00,99,AA,00,08,02,56,AA,A0,AA,437
4AA4 7A,FF,68,71,69,8F,47,52,45,45,46D 4B86 11,56,AA,A0,97,56,56,AA,A1,56,467
4AB4 4E,8F,43,41,4E,4F,45,FF,68,72,41C 4B90 12,AA,97,55,AA,12,AA,96,A1,66,4BD
4ABE 69,8F,52,45,44,8F,8F,8F,43,41,404 4B9A 52,AA,AA,A1,66,52,AA,00,95,A0,4DE
4AC8 4E,4F,45,FF,50,52,45,53,8F,3FD 4BA4 08,02,AA,95,61,AA,02,AA,95,95,42A
4AD2 41,4E,59,8F,4B,45,59,8F,54,4F,392 4BAE AA,02,AA,AA,A1,55,12,AA,AA,A1,4FD

Data Block 7

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4D32	00,AA,00,2A,00,AA,00,AA,00,00,228	4DCB	00,00,00,AA,00,AA,00,82,00,AA,280	4E5E	00,AA,AA,AA,00,AA,AA,AA,00,AA,4A6
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4D46	00,AA,00,AA,00,2A,00,AA,00,AA,2D2	4DDC	AA,AA,00,00,AA,00,AA,00,82,32A	4E72	00,AA,00,AA,AA,AA,00,AA,AA,AA,4A6
4D50	00,00,00,AA,00,AA,00,AA,AA,AA,352	4DE6	00,AA,00,AA,00,00,00,AA,00,00,1FE	4E7C	00,AA,00,AB,00,AA,00,AA,00,00,2A6
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4D64	00,AA,00,AA,AA,AA,00,AA,00,AA,3FC	4DFA	00,82,00,AA,00,AA,00,00,AA,280	4E90	AA,AA,00,AA,00,AB,00,AA,00,AA,3FA
4D6E	AA,AA,00,AA,AA,AA,00,AA,00,AA,406	4E04	00,00,00,AA,AA,AA,00,AA,AA,AA,3FC	4E9A	00,00,00,AA,00,AA,00,AA,AA,AA,352
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4D8C	00,0A,00,AA,00,AA,00,AA,AA,AA,35C	4E22	AA,AA,00,AA,00,A0,00,AA,00,AA,3F2	4EB8	2A,2A,2A,2A,2A,2A,2A,2A,2A,2A,1A4

Data Block 8

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4F14	00,2A,AB,00,AA,00,00,00,00,00,17C	4F78	BA,00,AA,00,00,00,AA,00,AA,AA,332	4FD2	AA,00,AA,AA,00,AA,00,AB,2A,00,37A
4F1E	00,AA,00,AA,00,2A,AB,00,AA,00,2D0	4F82	00,AA,00,A2,BA,00,AA,00,00,00,280	4FDC	AA,00,AA,AA,AA,00,AA,AA,00,AA,4A6
4F28	00,00,00,00,00,AA,00,AA,00,2A,17E	4F8C	AA,00,AA,AA,00,AA,00,A2,BA,00,3D4	4FE6	00,AA,AA,00,AA,00,00,AA,00,2AB
4F32	AB,00,AA,00,00,00,AA,00,AA,AA,350	4F96	AA,00,00,00,AA,00,AA,AA,00,AA,352	4FF0	AA,AA,00,AA,00,AA,AA,AA,00,AA,00,3FC
4F3C	00,AA,00,BA,A2,00,AA,00,AA,AA,3D4	4FA0	00,A2,BA,00,AA,00,00,AA,00,280	4FFA	00,00,AA,00,AA,AA,FE,00,FF,00,3FB
4F46	AA,00,AA,AA,00,AA,00,BA,A2,00,3D4	4FAA	AA,AA,00,AA,00,AB,2A,00,AA,00,37A	5004	FF,00,FF,00,FF,00,FF,00,FF,00,4FB
4F50	AA,00,AA,AA,AA,00,AA,AA,00,AA,4A6	4FB4	AA,AA,AA,00,AA,AA,00,AA,00,AB,4A4	500E	FF,00,FF,00,FF,00,FF,00,FF,00,4FB
4F5A	00,BA,A2,00,AA,00,AA,AA,AA,00,3D4				

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Choosing a Disk Drive

A disk drive is a major investment — plan before you buy, advises Geoff Ettridge.

DUE TO the demise of the Dragon as a games machine, many loyal users may be tempted to buy disk drive bargains appearing in various computer magazines. However, there is more to a bargain than the price; factors such as the suitability of the equipment to perform the tasks required of it, availability of software and its compatibility with other systems must also be considered. This is where the enthusiastic amateur can become unstuck through lack of knowledge. There is little written information and what is available tends to be in the form of snippets in articles or advertisements. There is then a need to collate and present the pieces of information gleaned from these various sources to help the less well informed among us to make a more objective choice. Judging by the standard of articles in *Dragon User* many readers may find this contribution simplistic, but then we all need some light reading from time to time!

The System

There are three parts to a disk drive system to be considered:

- (a) The disk drive.
- (b) The disk operating system (DOS).
- (c) Software.

Although I will consider each separately, the system as a whole needs to be designed and evaluated against the particular tasks that it will be expected to undertake.

Before looking at disk systems it is wise to ensure we appreciate the benefits of disks over cassette tapes for storing data and programs.

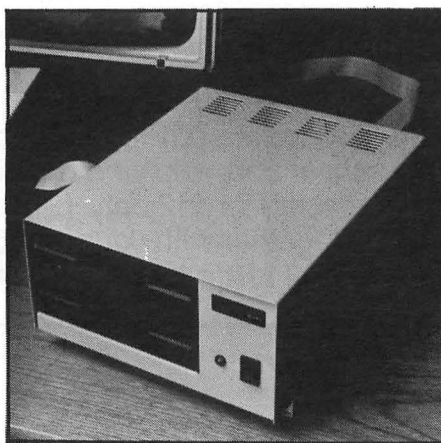
- (a) Files are read and written to disks far faster. A disk rotates at 300 rpm.
- (b) As files are stored in concentric rings on disks it is possible to directly access files, whereas a tape needs to be subsequently searched.
- (c) A disk system writes and keeps a catalogue or directly of the files on each disk.

The disk system therefore comes into its own when considering the handling of data files. Everyone who has attempted to use cassette data files has probably experienced errors arising from the slow acceleration of the tape record or the tedium of extending the duration of the leader tone. No such problems with disk drives. Different files of data can be accessed speedily and if the data was written to disk as a random file it is possible to jump around the file for specific items. This type of random

access file allows for parts to be updated, whereas a cassette data file would need to be totally re-written.

The simplest analogy for comparing disk and tape storage is to compare an LP with a music cassette. Once a track on an LP has been chosen the arm can be moved directly to that track. When another track is required the arm can be moved to the new location. It is difficult to perform the same regime with a tape as it is difficult to identify where one track ends and another starts. Although the higher speeds of fast forward and rewind can be used to move to a new track, the tape still needs to be sequentially searched.

Now for some definitions. A disk can be single or double sided and can be either single or double density. (Quad density is also available but I have yet to see any suggestion that it can be used on a Dragon system.) The number of sides needs no explanation except than to confirm that a double sided disk can store files on both sides so long as the disk drive being used is capable of such a task. The density of a disk affects the amount of data that can be stored on the disk. The greater the density the closer the information can be written on the disk and consequently the more data it can store.



Before a disk can store data it needs to be "formatted". This uses some of the storage capacity of the disk, so it is advisable when comparing two different systems to ensure that the formatted capacities are compared. The formatting of the disk results in it being divided into tracks and sectors. The disk operating system (the DOS) also writes essential information on the disk which will be used by the drive to find the desired programme or data file when the system is used. With the tracks and sectors numbered and a CATalogue or

DIRectory on the disk the drive can move speedily to the locations where the data is stored.

Each DOS system will format a disk differently, affecting the capabilities of various systems. The formatting of a disk also erases all data stored on it. It is therefore not possible to re-format a disk for another DOS without losing your data or files.

Now to consider the three principle parts of a disk system: The drive, the operating system (DOS) and the software.

The Disk Drive

The task of the drive is largely self-evident from the above. It needs to rotate a delicate piece of material, the disk, at high speed and to be able to read and write data on it at very precise points. The drive is therefore a precision instrument. This needs to be remembered when considering the purchase of a second-hand machine. A drop, or ham-fisted exploration by an inquisitive user, could have caused damage which could be expensive to rectify. Before purchasing a second-hand disk drive, see the system format a disk, write data to it and read it.

Some drives such as Dragon drives are only able to use one side of a disk. Double sided disks can be used in the drive but only one side will be used. This effectively halves the amount of information that can be stored on the disk. Double sided drives such as some of the Cumana models are able to use both sides of the disk but some problems can arise as a consequence of the DOS which means the double sided capacity cannot be used. This will be considered below under disk operating systems but generally this is not a great hindrance if the 'double sided' drive is able to format a single sided disk when required. Again the watch word is to check and if the system is able to format both type of disk then the versatility of the drive is enhanced.

When formatted, a disk is divided into tracks. The standard choice is either 40 or 80 tracks per disk, the 80 track offering twice the storage capacity of a 40 track disk. The number of tracks that can be formatted on a disk is dependent on the characteristic of the drive, the DOS and the disk. Even if the disk and the DOS is double density a 40 track drive will not be able to format or read an 80 track disk. As most software is sold on 40 track disks it is important to check that an 80 track drive is able to read a 40 track disk before it is purchased.

To have the best of both worlds, high storage capacity plus being able to use a range of software it is possible to find drives which are 40/80 switchable. The only problem posed by such drives is that the operator must remember to switch between modes for the differently formatted disks. Another solution could be to check that the software houses you use have the capacity to transcribe their 40 track software on to 80 track disks if requested.

Whether to purchase a single or dual drive is decision based on expense rather than the primary task that the disk system is required for. There are various systems on the market and to make a choice purely on cost could result in undermining the usefulness of your disk system. By having a dual system it is possible to designate one drive as a 'system' drive which will read the software being used while the other could be the 'work' drive which would store the data being used. A simple example is to consider a word processing package. The first drive could contain the program being used plus ancillary files such as a spell check while the other could hold files of documents that have been, or are being, prepared.

If a vast amount of storage space is not required it is maybe more convenient to operate with two single sided than one double sided drive.

Disk Size

The final aspect of the drive I propose to consider is the size of the disk. Mike Jones (*Computer Age*, January 1986) examined yet another scourge of home and business users alike, INCOMPATIBILITY. There are currently three main sizes of disk at present, 5¼ inch, 3½ inch, and 3 inch. Because of improved disk technology all three sizes hold approximately the same amount of data. The 5¼ inch disk is "floppy"; the casing is not rigid and the disk is vulnerable to damage through its exposure at the read/write slot. The 3 inch and 3½ inch disks are encased in a more rigid cover and the read/write slot is protected by a shutter which is opened as the disk is inserted into the drive. Some 3½ inch drives are compatible with 5¼ inch disk operating systems but again the watch word is to check the compatibility before purchase as the design of the drive maybe different, ie it may rotate the disk at an incompatible speed.

Making the choice of disk size is difficult, with much conflicting advice. The smaller disks are more solid but this could result in insufficient tender loving care being given, enhancing the risk of damage. Mike Jones after discussing the relative merits of the different size disk felt that the 3½ inch format held the most promise for longevity of fashion.

As far as Dragon users are concerned, *Dragon User* (September 1985) reported that Eurohards were planning to extend the range of Dragon disk drives available from the present single sided 40 track format. Whatever changes that are proposed to the range Eurohards were reported as intending to remain with the 5¼ inch disk.

If you propose to purchase a drive other than a 5¼ inch check on the availability of software. Check also, if you are not purchasing a total package, that the drive is compatible with the disk operating system you proposed to use.

Operating Systems

Disk Operating Systems (DOS) appear to

(1) ROM systems which interface with resident BASIC by adding disk handling commands, ie Dragon, Delta and Cumana systems.

(2) ROM systems which replace the ROM BASIC of the Dragon with a totally new system, ie the Plus System of Andtek Data Design.

(3) Software-based systems such as FLEX and OS9.

The ROM-based systems offer, to a varying extent, facilities beyond those necessary for a disk interface by adding some utilities to BASIC. For instance Cumana and Dragon DOSs add such commands as AUTO for automatic line numbering, a BEEP command and WAIT to introduce a pause in a programme, a useful alternative to FOR/NEXT loops. These additions are hardly sufficient reason to purchase the system, but represent 'a little candy'.

The Andtek system, however, makes significant changes to the way the Dragon performs by adding new commands and enhancing the screen display with green on black and 80 columns. (See *Dragon User*, November 1985 for a review.)

The software systems require a ROM system to be loaded. The ROM DOS must have a 'BOOT' command or equivalent which will load sectors of the disk which then takes over the operation of the system.

The software systems are expensive but FLEX and OS9 are extremely professional and sophisticated making the operation of the total system much more friendly. They also offer a 'way in' to serious software packages.

It is not necessary to have FLEX or OS9 to use your disk system seriously but powerful software has been written for both these systems so identify the prime tasks you wish to use your disk system for, find the software which will meet them and this may then indicate one of these systems are necessary.

If FLEX is chosen a Dragon 64 is necessary unless the PLUS cartridge mentioned above is used which is able to run FLEX on Dragon 32. An aspect of FLEX which may be attractive is that software that runs with FLEX will run on any machine which uses it, for instance the BBC. For reviews of FLEX see *Dragon User*, February 1985 and September 1985.

Software

A problem which may crop up if using Cumana or Dragon DOS is that it is unable to 'BOOT' a double sided disk. This should not pose any problems, so long as you remember to format a single sided disk when constructing a new system disk. Unless you are a skilled and addicted

programmer without interest in software produced by others you will need to be sure that the desired software is available for the system you propose to use. Most games and serious software appears to be available for Dragon and Delta DOSs. More recently Cumana DOS has increased its profile since they switched from Delta DOS to providing their own with their drives. Jason Orbaum, *Dragon User*, February 1986, reported from the 6809 show that Cumana DOS is not true Dragon DOS although it is compatible with it. This would suggest that software that will run on Dragon DOS will also run under the Cumana system. However, check your version of Cumana DOS, the V2.0 appears to be more compatible than earlier versions. Again, as there is no effective antidote to incompatibility it is advisable to ask and perhaps check for yourself the compatibility of the software and the DOS that you are using or propose to purchase.

Pre-purchase research is never a waste of time when considering the cash (or credit!) investment you may be making. There is no point in buying a 3½ inch drive, even if it is compatible with a 5¼ inch DOS if software houses only supply their programs on 5¼ inch disks.

The cost and availability of software needs also to be taken into account. For instance, there is more software available to run with FLEX. However a recent advertisement carried in *DRAGON USER* Mar 86 offered OS9 software at very competitive prices compared to the 'recommended retail price'.

Conclusions

It is a sad reality that Dragon support could become extinct in this country. The precarious economic environment in which the small computer firms operate is such that their demise could one day sound the death knell for others. There is therefore some wisdom in investing in equipment and software that can be used with other computer systems should this become necessary. Without checking all the combinations, which is not realistic because of the large number it is possible that inaccurate, inappropriate and biased advice could be obtained. But questions such as "will the disk drive operate with the DOS of another computer?" or "will software that runs under Dragon FLEX operate with FLEX on other systems?" may offer some enlightenment which could help you ensure your investment could be partly salvaged should the Dragon breathe its last fiery breath.

Throughout this "Thomas Cook" tour through disk drives and ancillary subjects the advice that should be evident is to take a wholistic approach. Identify the tasks you predominantly wish to undertake, look at the software and what it requires, and so far as possible look into the future to ensure you are not investing in obsolete equipment. Lastly, question, check and observe before parting with hard earned cash so that when you are 'all tooled up' all systems are ready to go.

Good luck for successful bargain hunting!

Error

I HAVE a Dragon 32 and a Star printer. I was playing with them when a message came up: ?DN ERROR. I looked it up on my list, but I couldn't find an explanation. Could you help please?

Daniel Lawrence
26 Lea Street
Lindley
Huddersfield
West Yorks
HD3 3LS

THE 'DN Error' stands for 'Device Number Error' and occurs if the channel number given in an OPEN, CLOSE, PRINT or INPUT command is invalid (ie if it is not -2, -1 and 0). Unfortunately, this error is not noted in the Dragon manual.

If you have a disc drive, then the error can also be caused by entering an invalid drive number.

Extra Poke

I AM currently writing an adventure game for my Dragon 32. However, I have now run out of memory and the game is uncompleted. I remember a POKE in a magazine which gave the user an extra 6K. Could you tell me this POKE, and whether or not it needs to be entered before loading?

David Eggleton
9 Tithe Road
Chatters
Cambs
PE16 6SL

THIS is one of those questions that come up more regularly than others on this page. The PCLEAR command can be used to reserve and release RAM used for the graphics modes. Typing PMODE 0,1:PCLEAR 1 will release all but one graphics page and allow the RAM to be used for your Basic programs. Unfortunately, it is not possible to enter PCLEAR 0 as this returns an error.

However, it is possible to achieve the same effect as PCLEAR 0 by typing the following:

POKE 25,PEEK (188):POKE PEEK (188)*256,0:NEW

This will take into account if a disc drive is attached and should be entered before loading any program that is to use the extra RAM.



On/Off

I HAVE two programs which run lengthy routines during which I want to switch off the TV I use with my Dragon 32. I intend to construct a small audio amplifier so that I can still use audio signals to indicate completion of the process.

I know that the audio signal is available from the monitor socket, but is there any DC available at a socket or must I build a separate power supply for the amplifier? If DC is available, at what voltage? Can you also please tell me the audio signal level at the monitor socket?

G. T. Denton
12 Falconwood Road
Addington
Croydon
CR0 9BB

THERE is no power source available at the monitor socket; however, you can get +5V on pin 5 of the joystick ports, and pins 2 and 4 of the Centronics port. The audio signal at the monitor socket conforms to the normal DIN standards.

Scroll

I HAVE been trying to write a machine code routine to scroll the PMODE 3/4 screen horizontally. I have tried two obvious methods:

- 1) ROR/ROL . . . (too slow)
- 2) Moving the screen byte by byte (too jerky)

Please could you tell me how the fast, smooth scrolling effect in games is achieved?

P. A. Chirico
Freshfields
158 Empingham Road
Stamford
Lincs PE9 2SZ

THERE are a number of different ways of fast scrolling the hires screen. The one I favour is word scrolling synchronised to the frame flyback.

You should write a routine to scroll the screen horizontally a byte at a time (move 16 bits at once using the 'D' register for speed), but wait for the frame flyback pulse before each whole scroll. This is achieved by waiting for bit 7 of \$FF03 to change. The result is fast and reasonably smooth horizontal scrolling.

Printer

I HAVE a Silver Reed Colour PenGraph Model EB50 with a built-in Centronics interface. Unfortunately when the PenGraph is connected to my Dragon 32 and is in PRINTER mode (on-line), it responds to the depressing of certain keys on the Dragon keyboard without any command such as PRINT#-2 being input to make it do so. This only happens with four keys, namely 5, 6, full-stop and hyphen, plus the SHIFTed versions of these same keys. When 5 or hyphen is pressed, a space is printed out by the PenGraph. When 6 or full-stop is pressed, the symbol @ is printed out either once or twice randomly. Any other key pressed immediately after one of these four keys may cause a repeat of the space or @ symbol being printed out. Can you tell me why this should happen?

Mike Whetstone
16 Thorngate Wynd
Barnard Castle
Co. Durham

THE same PIA port is used for both the Centronics printer interface and for reading the keyboard. Whenever the keyboard is read the values on

the data lines of the printer port will change. However, the printer should not respond to this as the 'strobe' line will be high. The printer will only print the character at the port when it is 'strobed' (the strobe line goes low then high).

Your problem seems to be with this strobe line. The most likely cause is the printer lead. I suggest you test the lead with another printer before suspecting the computer or printer.

Video

I AM attempting to write an article, ultimately for submission to *Dragon User*, about the use of the video recorder for saving programs from computer. At present the video and audio are fed into the video from the 'monitor' socket. A game, for example, can then be recorded on the video as it is played.

Using the cassette socket, the audio output CSAVE records to the 'audio dub' input on the video, and is fed back on CLOAD from the audio output DIN socket on the rear of the video. The recorded picture can then be wound back to the beginning and the program CSAVE onto the sound channel.

All the child wishing to load a game then needs to do is to 'SEARCH' through the video tape until he sees his game and then CLOAD it into the computer.

The problem is that many video machines do not possess an 'audio dub' facility, so what is needed is for the audio output present on the cassette socket on CSAVE to be also present on the 'monitor' audio output at the same time, which is not at present. Could you kindly advise me as to whether there is a software POKE or something to redirect CSAVE audio to the 'monitor' socket? I can find no mention of the 'monitor' socket in any of the literature I have at present.

Nick Brierley
5/6 Waterfall Cottages
Marsden
Huddersfield
HD7 6NQ

YOU can cause the CSAVE tones to be sent to the monitor socket by typing the following: POKE 65315, (PEEK(65315) OR 8):CSAVE "filename"

Presumably, this would be done within a program which is displaying one of its screens at the time.

Journey Planner

Get your Dragon to help you with your holidays with this useful program by Dr A Daniel

THIS IS a totally original idea to help you plan long car journeys. It times and costs them according to information you add from maps and guide books. As it stands it has been designed for continental motoring holidays with overnight hotel stops but I have listed below certain key lines which must be altered to suit your own requirements.

I have used it for several years and found it very helpful and it is also fun to use on imaginary journeys.

Having planned your trip, you can save it on tape, alter it, add in extra sections from tape or print it out.

As it is rather a long program I will send it for £1.10 or if you send an empty cassette and suitable stamped and addressed envelope to 8 Barnfield Road, Riverhead,

Kent, TN13 2AY — you can have it free.

Whether you type it or send for it do read the Rems in lines 20, 30, 220, 230, 280 and 430 which contain essential information.

Here now is a note of the important lines and a schedule to explain the general arrangement.

Line No

390 — contains calculations for the average speed on different types of road as stated in the schedule.

430 — calculates the cost of travel to the nearest pound at 4p per km or £2 per 31 miles. This can be adjusted for you may wish to work in miles or reset the costing to suit your car.

460 — one hour for lunch may be too little or too much. You can alter this remembering

TH is the hour variable and TM the minute one. LU is just a flag set to make sure you don't keep having lunch throughout the afternoon.

820-850 — When the program is running and you wish to correct an entry, you must reset the time to the time of departure from the previous town which you will find displayed on the screen. Make sure you know which day you are in too.

980 — This is how my family travel but you must suit yourselves. The 10 is added in line 1000.

910 and 960 — You may wish to put camping site instead of hotel.

The printer instructions are for a TANDY CGP115. Lines 1500, 1540 and 1550 may not suit other makes. In any case, enjoy planning your holiday!

```
10 ' HOLIDAY BY ANTHONY DANIEL - 17/3
/86
20 ' BEFORE STARTING ADJUST FORMULA F
OR OBTAINING THE CORRECT DATE OF YOUR HO
LIDAY IN LINES 1690 AND 1700 - 'Q' REPRE
SENTS THE TRUE DATE, 'DY(A)' IS THE NUMB
ER OF DAYS YOU HAVE BEEN AWAY"
30 ' YOU MAY ALSO WISH TO ENTER SOME
OF THE LINES BETWEEN 140-230 AS FIXED VA
RIABLES INSTEAD OF INPUTS WHICH HAVE TO
BE FILLED IN EVERY TIME THE PROGRAMME IS
RUN, AS YOU WILL PROBABLY ONLY PLAN ONE
HOLIDAY AT A TIME
40 PCLEAR1: CLEAR 12000
50 DIMT$(100),DD(100),DY(100),B$(100)
,H$(100),CC(100),AD$(100),LL$(100)
60 CI=0
70 CLS:PRINT
80 PRINT"DO YOU WISH TO rETRIEVE INFO
RMATION FROM CASSETTE OR PLAN A nEW TRIP
? PRESS 'R' OR 'N'
90 X$=INKEY$:IFX$=""THEN 90
100 IF X$="N" GOTO140
110 IF X$="R" GOSUB2180ELSE90
120 GOSUB1280
130 GOTO1120
140 PRINT"ENTER STARTING TIME"
150 INPUT"HOURS"; TH: TH=INT(TH)
160 IF TH=0 THEN 150
170 INPUT"MINUTES"; TM: TM=INT(TM)
180 A=1: X=A
190 INPUT"STARTING DAY";DY(A)
200 IF DY(A)=0 THEN DY(A)=1
210 IF DY(A)=1 THEN 220 ELSE 260
220 INPUT"METHOD OF TRAVEL";ZZ$: ' E.G
IF CROSSING CHANNEL PUT 'BY CAR FERRY'
OR 'FLY DRIVE' - SEE LINE 1810 FOR USE O
F ZZ$
230 IF ZZ$<>"" THEN INPUT"BASIC COST O
F TRAVEL";BC: ' THIS REFERS TO THE COST
OF FERRIES, MOTORAIL OR OTHER TRANSPORT
REFERRED TO IN ZZ$
260 CLS4: PRINTTAB(4)"IN THIS SECTION
YOU ENTER EACH TOWN YOU WISH TO VISIT,
```

```
ITSDISTANCE (IN KM) FROM THE LAST PLAC
E, THE TYPES OF ROAD YOU WILLBE TRAVELLIN
G ON, AND ANYTHING OF INTEREST THERE OR
ON THE WAY":PRINT
270 GOSUB1690
280 PRINTA:INPUT"NAME TOWN";T$(A): IF
T$(A)=""THENT$(A)="NONE": ' IF YOU ENTER
AN 'X' YOU CAN RESET THE TIME AND DAY OF
TRAVEL
290 IF T$(A)="X" THEN GOSUB820:GOTO280
300 RH=TH: RM=TM
310 INPUT"DISTANCE";DD(A)
320 INPUT"MOTORWAY DISTANCE";DM
330 INPUT"EXTRA SLOW ROAD DISTANCE";DS
340 IF DD(A)=0 AND (DM>0 OR DS>0) THEN
DD(A)=DM+DS
350 DR=DD(A)-(DM+DS)
360 LINEINPUT "FEATURES OF INTEREST ";
B$(A):IFB$(A)=""THENB$(A)="NONE"
370 B$(A)=B$(A)+" - ROADS M="+STR$(DM)
+" 0="+STR$(DR)+" S="+STR$(DS)
380 INPUT"HOW LONG DO YOU WANT THERE I
N HOURS";SS
390 TM=TM+((DM*2)/3)+((DR*6)/5)+(DS*3)
400 XX=INT(TM/60)
410 TH=TH+XX:TM=INT(TM-XX*60)
415 IF TH>23 THEN TH=TH-24: AY=1
420 T$(A)=T$(A)+" ARRIVING AT"+STR$(TH
)+STR$(TM)
430 C1=INT(DD(A)/25+DM/50): ' THE FRAC
TION DM/50 REPRESENTS FRENCH AND ITALIAN
MOTORWAY CHARGES. IF YOUR HOLIDAY IS EL
SEWHERE YOU CAN CUT IT OUT ALTHOUGH MOTO
RWAY DRIVING IS A BIT MORE EXPENSIVE ANY
WAY
440 CLS: PRINT@100,T$(A)
450 TH=TH+INT(SS): TM=TM+(SS-INT(SS))*
60: TM=INT(TM):PRINT
452 IF TM>60 THEN TM=TM-60: TH=TH+1: G
OTO452
454 IF TH>23 THEN TH=TH-24: AY=1: GOTO
480
460 IF TH<23 AND TH>12 AND LU=0 THEN T
```

```

H=TH+1: PRINTTAB(5)"ONE HOUR HAS BEEN AD
DED FORLUNCH":PRINT: LU=1
  470 IF TH>18 THEN 890
  480 PRINT"TO STOP FOR NIGHT PRESS 'N'
ELSE PRESS 'C'"
  490 IF LU=1 THEN PRINT"TO CUT OUT LUNC
H HOUR PRESS 'H'"
  500 PRINT"TO RE-DO THE LOT PRESS 'X'"
  505 PRINT:PRINT"TIME IS NOW";STR$(TH);
STR$(TM)
  510 NN$=INKEY$: IF NN$="" THEN 510
  520 IF NN$="X" THEN TH=RH: TM=RM: T$(A
)="":B$(A)="": TH=RH: TM=RM: GOSUB2580:
GOTO280
  530 IF NN$="H" AND LU=1 THEN TH=TH-1:
PRINT"TIME IS"TH;TM: LU=2: GOTO510
  540 IF NN$="N" THEN 890
  550 T$(A)=T$(A)+" DEPARTING AT"+STR$(T
H)+STR$(TM):PRINT
  560 IF NN$="C" THEN CC(A)=C1:GOTO570 E
LSE 510
  570 IF CI=1 THEN B=A: GOTO670
  580 M=DY(A)
  585 IF AY=1 THEN AY=0: M=M+1
  590 A=A+1
  600 DY(A)=M: X=A
  610 GOTO280
  620 CI=1: CO=A: CLS2:PRINTTAB(3)"PRESS
THE NO. OF THE TOWN FROM WHICH YOU W
ISH TO BEGIN ALTERATIONS"
  630 PRINT:PRINTTAB(3)"IF YOU WISH TO C
UT OUT A TOWNENTIRELY ENTER NO. AS A NEG
ATIVE": PRINTTAB(3)"TO INSERT AN EXTRA T
OWN OR TOWNS ADD ONE OR MORE HUNDRED T
OTHE NUMBER OF THE TOWN"
  640 PRINT:PRINTTAB(3)"PRESS ENTER TO L
IST TOWNS":PRINT:
  650 PRINTTAB(3)"PRESS CLEAR TO FINISH"
:PRINT
  660 PRINTTAB(3)"PRESS SPACEBAR TO ENTE
R NO.": B=0: GOTO690
  670 PRINTB;" ";T$(B)
  680 IF B>X THEN B=0
  690 L$=INKEY$: IF L$="" THEN 690
  700 IF B=0 THEN PRINT
  710 IF L$=CHR$(12) THEN A=X: CI=0: GOT
O1120
  720 IF L$=CHR$(32) THEN 750
  730 IF L$=CHR$(13) THEN B=B+1: GOTO670
  740 GOTO690
  750 INPUT"TOWN NO";C
  760 IF C<0 THEN C=C*-1: GOSUB2420: GOT
O670
  770 IF C>100 THEN GOSUB2490: GOTO670
  780 IF C<1 OR C>X THEN 750
  790 CLS2:IF C>1 THEN A=C-1: PRINTT$(A)
:PRINT
  800 A=C: GOSUB1370
  810 H$(A)="": CC(A)=0:GOSUB820: GOTO28
0
  820 INPUT"TIME CORRECTION";JH,JM
  830 IF JH>0 THEN TH=JH: TM=JM
  840 INPUT"DAY CORRECTION";HY
  850 IF HY>0 THEN DY(A)=HY
  860 GOSUB1690
  870 RETURN
  880 B=1: GOTO670
  890 CLS2: IF TH>18 THEN PRINT"IT'S ABO
UT TIME YOU STOPPED FOR THE NIGHT"
  895 IF AY=1 THEN AY=0: HD=DY(A)+1 ELSE
HD=DY(A)
  900 PRINTUSING" THE TIME IS ## ## ON D

```

```

AY ##";TH, TM, HD
  910 PRINTTAB(5)"DO YOU WISH TO MAKE A
NOTE OF A HOTEL?"
  920 PRINT"IF NOT YET CHOSEN TYPE 'NYC'
"
  930 PRINT"IF TOO EARLY TYPE 'NO'"
  940 LINEINPUT "NAME ";H$(A)
  950 IF H$(A)="NO" OR H$(A)=" NO" THEN
H$(A)="": GOTO480
  960 H$(A)="ARRIVAL AT HOTEL "+H$(A)+"
AT"+STR$(TH)+STR$(TM)
  970 INPUT"TOTAL DINNER, B.+B. COST";BB
  980 PRINTTAB(2)"TEN POUNDS HAVE BEEN A
LLOCATEDFOR YOUR PICNIC TOMORROW, IF YOU
WISH TO ADD ON ANY OTHER EXPENSEYOU MAY
HAVE HAD DURING THE DAY SUCH AS FARES OR
ENTRANCE FEES DO SO NOW"
  990 INPUT XC
  1000 C2=C1+XC+BB+10
  1010 H$(A)=H$(A)+" COST"+STR$(BB)+" EXT
RAS"+STR$(XC+10)
  1020 PRINTTAB(4)"YOUR TOTAL COSTS TO DA
Y ARE"C2: LU=0
  1030 IF CI=1 THEN B=A: GOTO670
  1040 PRINTTAB(4)"NOW INDICATE THE TIME
FIRST IN HOURS THEN IN MINUTES WHEN YO
U WISH TO START NEXT MORNING."
  1050 PRINT"BUT ENTER 'X' TO REDO THIS P
ART OR 'H' TO FINISH OFF HOLIDAY.": CC(
A)=C2
  1055 INPUT"HOURS";SH$: IF SH$="X" THEN
H$(A)="": GOTO 890
  1060 IF SH$="H" THEN 1760 ELSE SH=VAL(S
H$)
  1070 IF SH<1 OR SH>24 THEN 1055
  1090 TH=SH
  1100 INPUT"MINUTES";TM
  1110 X=A: N=DY(A)
  1120 CLS5:PRINT@96,""
  1130 PRINT
  1140 PRINTTAB(5)"IF YOU WISH TO EXAMINE
THE SUMMARY OF YOUR TOUR PRESS 'S'"
  1150 PRINTTAB(5)"IF YOU WISH TO PUT DET
AILS ON TAPE PRESS 'R'"
  1160 PRINTTAB(5)"IF YOU WISH TO TAKE DE
TAILSFROM TAPE PRESS 'T'"
  1170 PRINTTAB(5)"IF YOU ARE DISSATISFIE
D ANDWISH TO ALTER TOUR PRESS 'A'"
  1180 PRINTTAB(5)"TO CONTINUE TOUR PRESS
'C'"
  1190 Y$=INKEY$:IFY$=""THEN1190
  1200 IF Y$="A" GOTO620
  1210 IF Y$="C" GOTO1260
  1220 IF Y$="R" GOTO1990
  1230 IF Y$="T" THEN GOSUB2180
  1240 IF Y$="S" GOSUB1280ELSE1190
  1250 GOTO1120
  1260 GOSUB1580
  1270 GOTO280
  1280 CLS8
  1290 PRINTTAB(4)"INPUT THE NUMBER OF TH
E TOWNYOU WISH TO CHECK. IF IN DOUBT ST
ART AT 1 AND WORK THROUGH. TO LEAVE DISP
LAY ENTER 0.
  1300 PRINT"BUT FIRST...":GOSUB1850
  1310 IF PA=1 THEN A=A+1: GOTO1320 ELSE
1340
  1320 IF A>X THEN PA=0: GOTO1340
  1330 GOTO1360
  1340 INPUT"TOWN NO.": A
  1350 IF A=0 GOTO1570
  1360 CLS8
  1370 PRINTLL$(A): IF PO=1 THEN PRINT#-2

```



```

,LL$(A):PRINT#-2," (TO) ";T$(A);" (" ;A;
")"
1380 PRINT"JOURNEY TO ";T$(A);" (" ;A;
)"
1390 PRINT"FEATURES OF INTEREST ";B$(A)
1400 IF PO=1 THEN GOTO1410ELSE1420
1410 PRINT#-2,"NOTE:- ";B$(A)
1420 PRINT"DISTANCE TRAVELLED";DD(A)
1430 IF PO=1 THEN GOTO1440ELSE1450
1440 PRINT#-2,"DISTANCE ";DD(A)
1450 PRINT"COST";CC(A)
1460 IF PO=1 THEN GOTO1470ELSE1480
1470 PRINT#-2,"COST";CC(A)
1480 IF H$(A)="NYC" THEN H$(A)="NOT YET
CHOSEN"
1490 IF H$(A)<>" "GOTO1520
1500 IF PO=1 THEN PRINT#-2,CHR$(18):PRI
NT#-2,"M0,-10)":PRINT#-2,CHR$(17)
1510 IF CI=1 THEN RETURN ELSE GOTO1310
1520 PRINTH$(A): IF PO=1 THEN PRINT#-2,
H$(A)
1530 PRINTAD$(A): IF PO=1 THEN PRINT#-2
,AD$(A): GOTO1540 ELSE 1560
1540 PRINT#-2,CHR$(29)
1550 PRINT#-2,CHR$(11)
1560 IF CI=1 THEN RETURN ELSE GOTO1310
1570 RETURN
1580 CLS8
1590 DD=0:CC=BC
1600 FOR P=1 TO X
1610 DD=DD+DD(P)
1620 CC=CC+CC(P)
1630 NEXT
1640 AD$(A)=AD$(A)+"TOTAL COST"+STR$(IN
T(CC))+ " - TOTAL DISTANCE"+STR$(DD)+" TO
DATE"
1650 PRINTAD$(A): IF PO=1 THEN PRINT#-2
,AD$(A)
1660 IF UU=1 THEN RETURN
1670 A=X+1: X=A
1680 DY(A)=N+1
1690 Q=DY(A)+25: IF Q>31 THEN Q=Q-31
1700 IF Q>25 THEN L$=" MAY" ELSE L$=" J
UNE"
1710 LL$(A)="TIME IS"+STR$(TH)+STR$(TM)
+" ON DAY"+STR$(DY(A))+L$+STR$(Q)
1720 PRINTLL$(A)
1730 IF PO=1 THEN PRINT#-2,LL$(A)
1740 PO=0
1750 RETURN
1760 X=A: N=DY(A):CLS3:PRINTTAB(5)"YOU
HAVE NOW COMPLETED YOURJOURNEY IN";N;"DA
YS"
1770 IF PO=1 THEN PRINT#-2,"YOU HAVE NO
W COMPLETED YOUR JOURNEY IN";N;"DAYS"
1780 CLS3:PRINTTAB(5)"YOU CHOSE TO TRAU
EL ";Z$: UU=1: GOSUB1590: UU=0: PRINT:P
RINT"TO PUT THIS INFORMATION IN PRINTPRE
SS 'P' ELSE PRESS ANY OTHER KEY"
1790 PT$=INKEY$: IF PT$="" THEN 1790
1800 IF PT$="P" THEN 1810 ELSE 1820
1810 PRINT#-2,"YOU CHOSE TO TRAVEL ";Z$
$ : PRINT#-2,AD$(A)
1820 CLS: GOTO1120
1830 IF INKEY$=CHR$(32)GOTO1840 ELSE183
0
1840 CLS:GOTO1120
1850 PRINT"FOR PRINT OUT PRESS 'P'"
1860 PRINT"FOR AUTOMATIC PRINT OUT - 'A
',"
1870 PRINT"TO CANCEL PRINT OUT - ','"
1880 PRINT"ELSE PRESS ANY OTHER KEY"
1890 PT$=INKEY$:IFPT$=""THEN1890

```

```

1900 IF PT$="/" THEN PO=0
1910 IF PT$="A" THEN PO=1: PA=1: A=0
1920 IF PT$="P" THEN PO=1
1930 RETURN
1990 CLS0: PRINTTAB(5)"TO STORE TOUR ON
TAPE, SET RECORDER AND PRESS'G'": PRINT
"RECORDING";X;" TOWNS"
2000 POKE144,3
2010 Y$=INKEY$: IF Y$="" THEN 2010
2020 IF Y$="Q" THEN 2040
2030 IF Y$="/" THEN 1120 ELSE 2010
2040 OPEN"O",#-1,"HOLIDAY"
2050 PRINT#-1,BC,Z$
2060 PRINT#-1,X,N
2070 FOR A=1 TO X
2080 PRINTA;" ";T$(A)
2090 PRINT#-1,T$(A),B$(A),H$(A),AD$(A),
LL$(A)
2100 PRINT#-1,DD(A),CC(A)
2110 PRINT#-1,DY(A)
2120 NEXT
2130 CLOSE#-1
2140 CLS5:PRINT"ALL FINISHED - TURN OFF
CASSETTE"
2160 FOR J=1 TO 1000:NEXT
2170 GOTO1120
2180 PRINT"YOU ARE AT TOWN";X
2190 INPUT"START NO:- ";E1
2200 IF E1<2 THEN E1=1
2210 IF E1>99 THEN 2180
2220 CLS0:PRINT"SET RECORDER AND PRESS
,P'"
2230 PT$=INKEY$: IF PT$="" THEN 2230
2240 IF PT$="P" THEN 2270
2250 IF PT$="/" THEN RETURN
2260 GOTO 2230
2270 OPEN"I",#-1,"HOLIDAY"
2280 INPUT#-1,BC,Z$
2290 INPUT#-1,X,N
2300 PRINTX
2310 FOR A= E1 TO (E1+X-1)
2320 INPUT#-1,T$(A),B$(A),H$(A),AD$(A),
LL$(A)
2330 PRINTA;" ";T$(A)
2340 INPUT#-1,DD(A),CC(A) 2360 NEXT
2350 INPUT#-1,DY(A) 2370 CLOSE#-1
2380 CLS5:PRINT"ALL FINISHED - TURN OFF
CASSETTE"
2390 PRINT"TO CONTINUE YOU MUST ENTER S
TARTING TIME": INPUTTH, TM
2400 IF TH=0 THEN 2390 2420 'DELETION
2410 RETURN 2430 FOR R=C TO X
2440 T$(R)="" :DD(R)=0:DY(R)=0:B$(R)="" :
H$(R)="" :CC(R)=0:AD$(R)="" : LL$(R)=""
2450 T$(R)=T$(R+1): DD(R)=DD(R+1):DY(R)
=DY(R+1): B$(R)=B$(R+1): H$(R)=H$(R+1):C
C(R)=CC(R+1):AD$(R)=AD$(R+1): LL$(R)=LL$
(R+1)
2460 NEXT 2480 RETURN
2470 X=X-1 2490 D=0
2500 C=C-100: D=D+1: IF C>100 THEN 2500
2520 FOR R=X TO (C+1) STEP-1
2530 T$(R+D)=T$(R): DD(R+D)=DD(R):DY(R+
D)=DY(R): B$(R+D)=B$(R): H$(R+D)=H$(R):C
C(R+D)=CC(R):AD$(R+D)=AD$(R): LL$(R+D)=L
L$(R)
2540 T$(R)="" :DD(R)=0:DY(R)=0:B$(R)="" :
H$(R)="" :CC(R)=0:AD$(R)="" : LL$(R)=""
2550 NEXT 2580 IF RH<13 THEN LU=0
2560 X=X+D 2590 RETURN
2570 RETURN

```

Extra Graphics

*He liked the software so much — he wrote his own.
Peter Whittaker on the Touchmaster Graphics Tablet.*

HAVING bought a TouchMaster Graphics Tablet, I can agree with Mike Gerrard that it is well worth the price of £52.50 (*Dragon User*, February 1986). When I first bought the tablet, I was quite impressed with the graphics available through the *Multipaint* program, but after a short while I felt that it needed improving.

The program I have written is based around the Dragon 64 with disk drive to obtain a printer resolution of 512 pixels by 384, which is better than the Apple Macintosh at 512 by 342 pixels. The program can easily be converted to work with cassette tape instead of with disks, although the machine code routines will need to be altered to take account of the different graphics screen addresses. The program will also work on the Dragon 32 with the loss of the extra big graphics screen facility.

The Graphics Tablet

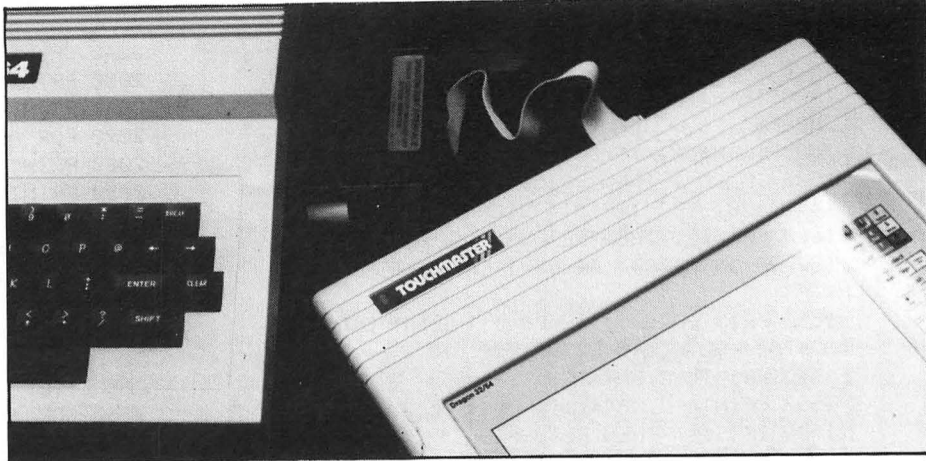
The graphics tablet is connected to the Dragon via the cartridge port, but is not patched into Dragon Basic. There is no equivalent of the *JOYSK* command to read the position of a pen on the pad. Instead a short program is needed to read whether the pen is pressing the pad, and if so, where. (Assembler #1. *PADCODE*.)

Unfortunately, the pad does not use the same resolution as the Dragon's graphics screen (256*192), but has a resolution of 256*256. This means that the pixels are not square in shape. A circle drawn on the pad will look like a squashed egg on the screen unless the Y co-ordinates are suitably adjusted. The program will store the unaltered co-ordinates at *X=PEEK (&H7FC2)*; *Y=PEEK (&H7FC4)* and the modified co-ordinates at *X=PEEK (&H7FC3)*; *Y=PEEK (&H7FC5)*.

As listed, the program will read the pad and then set the equivalent pixel on the graphics screen to enable free hand drawing. However, by altering the code, *POKE&H7F74,57* the program will stop before setting the pixel, and the machine code routine can be used to read the position of the pen on the pad for use with other functions.

The Main Program

Type in Listing #1, and save it to tape. If you do not have a disk drive remember to change all the save/load routines from *SAVE A\$,3072,9216,41194* to *CSAVEM A\$,1536,7680,41194*. Now type in Listing #2, the machine code loader, *CLEAR200,32000*, and then RUN it. Enter the start and end addresses of 32501 and 32715, and then enter the data for *PADCODE*. Type in each line of 16 digits, and then press enter. Then enter the total given



at the end of the line. When you have typed in all the data, save it to tape/disc, with *CSAVEM "PADCODE", 32501, 32715, 32501*. Now do the same with the *BIGSCREEN* data, using 32241 and 32495 as the start and end addresses. You can now rewind the tape, *CLOAD*, and *RUN* the program.

When *RUN*, the program loads in the code, and then displays the graphics screen whilst the various variables are initialised. When the program is ready, the top left corner of the screen will be inverted, and then restored. (Black to white and back again.) This inverted area of the screen refers to the area of graphics memory currently being addressed by the pad.

Unlike *Multipaint*, the program is controlled from the keyboard, since the whole surface of the graphics tablet is used for drawing. Each time a key is pressed, the current screen is backed up to graphics pages 5 to 8. This allows for the inclusion of an *Oops* routine, called by pressing the *<O>*, which will delete everything entered since the last key press, and help to correct any mistakes. Pressing the *<C>* will save the current screen to an array, so that it can be restored *<R>* after several separate drawing operations.

Press the pen on the pad, and any free hand drawing will be displayed on the screen, to the scale of the original inverted box. To facilitate detailed drawing, there are four different drawing sizes available, and these are called by pressing the number keys from *<1>* to *<4>*.

<1> will set the pad to draw over the whole screen, *<2>* will draw on a quarter screen, *<3>* on a sixteenth, and *<4>* on a sixty-fourth. Each time the scale is changed, the program will invert and restore the relevant area of the screen. Whilst the full scale *<1>* will allow drawing over the whole screen, the other scales require the drawing area to be positioned over the appropriate area of the screen. This is done by pressing any of the four narrow keys. Each time the

drawing area is moved, the program will invert the relevant area of the screen to show where the drawing area is now positioned.

The program is error trapped to prevent the drawing area from running over the edge of the screen. To help position the pen in the right place when using the various drawing scales, the *<F>* key will place a frame over the drawing area. This eight by eight grid will be scaled to show the area covered by the whole pad, and will be displayed until another key is pressed.

There are several different brush types available as an alternative to the freehand pixel mode selected by default. These routines are called by the *<D>* key, and then give a choice of circles, lines or boxes. Circle radius, and box/line x/y offsets are selected, and then the program returns to the graphics screen. Freehand drawing will now use the selected brush type. To return to the main program press the *<Q>*, which will also return you to the pixel drawing mode.

The next available function is the Dragon's *GET* and *PUT* command. This will get an area of screen memory into an array, and then allow it to be copied to any other area of the screen. Press the *<G>* to call the *GET* routine. Two lines will be drawn from the pen position, one off to the right hand border, and one to the bottom of the screen. This is to show the top and left hand edges of the area which will be got. When the pen has selected the correct point, press Enter to lock it in.

Now, as the pen is moved around the screen, the program will draw a box from the first point to the current point, indicating the total area which is going to be copied to the array. This area must not exceed 10000 pixels (10*1000, 100*100 etc) or it will be too big for the array. When the box is correctly positioned, press Enter again to copy the picture. If the area is too big for the array, it will not copy across and the program will continue to wait for the second

point to be selected. The routine can be aborted by pressing the **Q** key.

Having copied a picture into the array, it can be recopied back to the screen by pressing either the **P** or **B** keys. The **P** key will put the array back on the screen, wiping out whatever background it covers, whilst using the **B** key will place both the array and the background on the screen. Whichever key is used, the picture will flash on and off wherever the pen is placed. Press Enter to select the desired position, or the **Q** to quit the routine. The array will keep the same picture in it, so there is no need to reGET it each time.

The next function, called by pressing the **A** key, prints on screen any letters entered via the keyboard. When called, the routine will first ask for a scale at which to draw any letters (1-16), and then ask for an angle at which to draw the letters, up, down, left, or right (0-3). The program will then display two crossed lines to mark the pen position from which the letters will be drawn. When the pen is in the correct position just start to type, and the program will draw the letters on screen. Press Enter to finish the text input. If you make a mistake in your typing, finish the text routine, and then press the **O** ops key to delete it.

The last drawing routine provided is called by the **W** key, and accesses the Dragon's **LINE**, **box** and **CIRCLE** commands. The program will ask for which of the three options you want, and then return to the graphics screen. Position the pen to select the first point (end of a line or centre of a circle), and press Enter. When the pen is placed on the screen, the program will draw in the appropriate shape between the two points. Press Enter to select any given shape, and the program will fix it in the display, and start on another. In this way, for example, several concentric circles can easily be drawn. To quit the routine, you need to press the **Q**.

All of the above functions are fully available on the Dragon 32, but the following routine is not. When in 64K mode, the Dragon uses all 64K or RAM chips, but whilst it is in 32K mode, only half of these are used. (The other 32K is hidden 'under' the Basic ROM and cartridge memory.) To obtain the high resolution printer graphics memory, I have set aside 24K of this extra memory for graphics. The 256x192 graphics screen acts as a window on this

greater area of graphics memory (512x384). By pressing any of the Arrow keys with the Shift key, this window can be scrolled over the larger graphics display. Each time the window is scrolled, its contents are copied up to the 'Bigscreen', and the display for the new location are copied down. Pressing the **Z** key will compress this Bigscreen down to fit on the display screen so that an idea of the total picture can be gained. The program then waits for a keypress before returning to the window display.

The extra memory for the Bigscreen is accessed by a short machine code routine, **BIGSCREEN** (Assembler #2). It first **POKE 65283, PEEK (65283) and 254** to stop the interrupts. Then it pokes to **&HFFDF** to switch the computer to 64K RAM mode. In this mode, the Basic ROM and cartridge port no longer exist as far as the computer is concerned. However, the extra memory can be used, and we can copy to and from the display screen. When we are finished, the program pokes to **&HFFDE** to return to 32K mode, and **POKE &H65283, PEEK (65283) OR 1** to restore the interrupts.

The program includes a save/load routine for both the display screen and the bigscreen. **SS** or **LS** will save/load the display screen, whilst **SB** or **LB** will save/load the Bigscreen. The display screen load/save routines ask for a screen title, and then load/save it to disc. The Bigscreen routines also ask for a title, but only use the first seven letters. The save routine will copy down the Bigscreen to the display screen in four quarters, saving each one separately, and numbering them from 1 to 4. The load routine will load each screen back to the display, and then copy it up to high memory. (If using cassette tape, remember to delete the '.BIN' from the load routines. Lines 350-380 and 860.) The last key to remember is the **M** which calls the menu display, to remind you of which key does what. The only routines not mentioned are the **Z** to display the compressed screen, and the **CLEAR** to PCLS the display screen.

Modifying the Program

With disk drives attached, the program only leaves about 500 bytes of memory, so there is little room for improving the program. If using cassette, the extra memory will be

boosted to 2K, and there is space enough for a few extra routines, such as a fill routine.

If using discs on the 64, there is little use for the backup screen (**C** and **R**) so this routine could be deleted, including the array **AR**. This would clear enough memory for several program modifications.

If using a Dragon 32, then it is advisable to delete the Bigscreen routine, and gain extra memory that way (delete 90-210). For use without a disc drive attached, the machine code routines will also have to be altered to take account of the different memory used by the graphics screens. Before saving 'BIGSCREEN', **POKE&H7E115,6: POKE&H7E225,&H1E: POKE&H7E3A,6: POKE&H7E4A,&H1E: POKE&H7E74,6: POKE&H7EDB,&H1E.**

If you do not yet have a TouchMaster Graphics Tablet, but do have a Dragon 64, it is possible to convert the program for joystick control instead of the pad. Instead of calling the **PADCODE** machine code routine (**EXEC32501**) one can read the joysticks, and instead of checking for a pen pressing on the pad, could check the fire-button. The program should still be able to make use of the four different drawing resolutions, and various extra routines.

Printing the Bigscreen

Because the Bigscreen is hidden under the Basic ROM, it can not be accessed by a Basic program alone. The **BIGSCREEN** machine code routine is required again to copy data to the display screen for printing. The printer routine (**LISTING #3**) is set up for the Seikosha GP100A. Lines 10-20 set up the machine code, whilst 60-100 load the graphics picture into high memory. Line 120-end prints out the picture.

The program works by copying the bigscreen down to the display screen in two lines, and then copying these to the printer. Insert a **SCREEN1,0** command as Line 115, and you will be able to watch this happen. By varying the amount of data copied down (**Q** in line 180), and the printout format, the program can easily be modified to work with any other printer.

If you don't want to type in the whole program, I can supply copies on cassette tape for £3. Send a cheque or postal order to Peter Whittaker, 73 Norwich Street, Cambridge CB2 1ND.

Padcode

```
32501 : 4FB7FF50B7FF5FB7= 1326
32509 : FF5C8601B7FF5E86= 1148
32517 : 04B7FF50B7FF5FB0= 1257
32525 : 7FACC1C010250096= 887
32533 : 8D7FAC86403DFD7F= 1127
32541 : C2BD7FAC86013DF3= 1121
32549 : 7FC244564456FD7F= 1009
32557 : C2BD7FAC86403DFD= 1194
32565 : 7FC48D7FAC86013D= 1007
32573 : F37FC444564456FD= 1127
32581 : 7FC4867FC5B77FC4= 1335
32589 : C6033D44564456F7= 817
32597 : 7FC586BF807FC5B7= 1332
```

```
32605 : 7FC5B67FC3B77FC2= 1332
32613 : 444444877FC3B67F= 1018
32621 : C5444444877FC512= 926
32629 : B67FC3F67FC58E0C= 1228
32637 : 00C1002706308820= 454
32645 : 5A20F6F67FC35446= 1090
32653 : 544654463A444444= 570
32661 : 4444C68081002704= 634
32669 : 4A5420F8F77FC6A6= 1176
32677 : 84BA7FC6A7843986= 1133
32685 : 01B7FF5EB6FF5D84= 1195
32693 : 80810012124FB7FF= 810
32701 : 5EF6FF5C39000000= 744
32709 : 00000000008000FB= 379
```

Bigscreen

32241	:	B6FF0384FEB7FF03=	1267	32361	:	04F67EEE59F77EEE=	1314
32249	:	B7FFDF8E80E8B67E=	1471	32369	:	39108E0C008E00E8=	729
32257	:	ED27063088404A20=	636	32377	:	B6FF0384FEB7FF03=	1267
32265	:	F8B67EEC308639BD=	1220	32385	:	B7FFDF8620B77EEB=	1371
32273	:	7DF1108E0C008620=	702	32393	:	A6807F7EEEEBD7E5A=	1190
32281	:	E6A0E7804A26F930=	1158	32401	:	BD7E5ABD7E5ABD7E=	1125
32289	:	8820108C240025EE=	635	32409	:	5AA680BD7E5ABD7E=	1104
32297	:	B7FFDEB6FF038A01=	1239	32417	:	5ABD7E5ABD7E5AF7=	1147
32305	:	B7FF0339BD7DF110=	1069	32425	:	7EEF7F7EEEA6883E=	1220
32313	:	8E0C008620E680E7=	909	32433	:	BD7E5ABD7E5ABD7E=	1125
32321	:	A04A26F930882010=	753	32441	:	5ABD7E5AA6883FBD=	1049
32329	:	8C240025EEB7FFDE=	1111	32449	:	7E5ABD7E5ABD7E5A=	1026
32337	:	B6FF038A01B7FF03=	1020	32457	:	BD7E5AFA7EEFE7A0=	1411
32345	:	395F48564856C100=	661	32465	:	7A7EEB26B3308840=	948
32353	:	2707F67EEE595C20=	869	32473	:	108C240025A5B7FF=	832
				32481	:	DEB6FF038A01B7FF=	1239
				32489	:	03390000000000FB=	311

Assembler 1 — Padcode

7EF5	3000	PRT	7F42	44	70	LSRA	7F8C	46	130	RORA		
7EF5	4F	20	7F43	56	70	RORB	7F90	54	130	RORA		
7EF6	B7FF5D	20	7F44	F07FC4	70	STD	7F9E	46	130	LSRB		
7EF9	B7FF5F	20	7F47	B67FC3	80	LDA	7FAF	3D	130	LSRB		
7EFC	B7FF5C	20	7F4A	B77FC4	80	LDA	7FBF	54	130	RORA		
7EFF	8581	20	7F4C	C503	80	LDB	7F90	46	130	RORA		
7F01	B7FF5E	20	7F4F	3D	80	MUL	7F91	3A	130	ABX #DIVIDE BY 8 TO GET BIT*		
7F04	8584	20	7F50	44	80	LSRA	7F92	44	140	LSRA		
7F06	B7FF5D	20	7F51	56	80	RORB	7F93	44	140	LSRA		
7F09	B7FF5F	20	7F52	44	80	LSRA	7F94	44	140	LSRA		
7F0C	B07FAC	30	7F53	56	80	RORB	7F95	44	140	LSRA		
7F0F	C108	30	7F54	F77FC5	80	STB	7F96	44	140	LSRA		
7F11	10238096	30	7F57	868F	85	059	LDA	7F97	C680	150	LDB #128	
7F15	B07FAC	40	7F59	B07FC3	85	SUBA	7F99	8100	150	053	CMR #8	
7F18	8548	40	7F5C	B77FC3	85	STA	7F9A	2704	150	BEQ	054	
7F1A	3D	40	7F5F	B67FC3	90	LDA	7F9D	4A	150	DECA		
7F1B	F07FC2	40	7F62	B77FC2	90	STA	7F9E	54	150	LSRB		
7F1E	B07FAC	50	7F65	44	90	LSRA	7FAF	20F8	150	BRA	053	
7F21	8581	50	7F66	44	90	LSRA	7FA1	F77FC6	160	054	STB	0PIXEL
7F23	3D	50	7F67	44	90	LSRA	7FA4	A684	160	LDA	,X	
7F24	F37FC2	50	7F68	B77FC3	90	STA	7FA6	B07FC6	160	ORA	0PIXEL	
7F27	44	50	7F6E	44	90	LSRA	7FA9	A784	160	STA	,X	
7F28	56	50	7F6F	44	90	LSRA	7FAB	39	170	0QUIT	RTS	
7F29	44	50	7F70	44	90	LSRA	7FAC	8601	1000	0GETXY	LDA #1	
7F2A	56	50	7F71	B77FC5	90	LSRA	7FAE	B7FF5E	1000	STA	0FF5E	
7F2B	F07FC2	50	7F74	12	95	NOP	7FB1	B6FF5D	1010	0L1	LDA	0FF5D
7F2E	B07FAC	60	7F75	B67FC3	100	LDA	7FB4	8480	1010	ANDR	ANDR	#80
7F31	8548	60	7F78	F67FC5	100	LDB	7FB6	8100	1010	CMR	#0	
7F33	3D	60	7F7B	B67FC3	100	LDB	7FB8	12	1010	NOP		
7F34	F07FC4	60	7F7E	C100	110	LDA	7FB9	4F	1020	CLRA		
7F37	B07FAC	70	7F82	308820	120	BEQ	7FBA	B7FF5E	1020	STA	0FF5E	
7F38	8581	70	7F85	56	120	DEC	7FBE	F6FF5C	1030	LDA	0FF5C	
7F3C	3D	70	7F86	20F6	120	BRA	7FC1	39	1030	RTS		
7F3D	F37FC4	70	7F88	F67FC3	130	052	7FC2	0000	2000	0X	FDB	0
7F40	44	70	7F89	54	130	LSRB	7FC4	0000	2000	0Y	FDB	0
7F41	56	70	7F8B	54	130	LSRB	7FC8	0000	2000	0PIXEL	FDB	0
								3000	END	0START		

Assembler 2 — Bigscreen

7DF1	1000	PRT	7E48	108C2400	210	CMR	#9216	7E9C	8D7E5A	410	JSR	0SUB1		
7DF4	84FE	20	7E4C	25EE	210	BLO	0CUI	7E9F	8D7E5A	410	JSR	0SUB1		
7DF6	B7FF83	20	7E4E	B7FFDE	220	STA	0FFDE	7EA2	8D7E5A	410	JSR	0SUB1		
7DF9	B7FFDF	20	7E51	B6FF03	220	LDA	65283	7EA5	8D7E5A	410	JSR	0SUB1		
7DFC	8E00E8	30	7E54	8A01	220	ORA	#1	7EAB	F77EEF	410	STB	0BYTE1		
7DFE	B67EED	30	7E56	B7FF03	220	STA	65283	7EAB	7F7EEE	420	CLR	0BYTE		
7E02	2706	40	7E59	39	220	RTS		7EAB	7F7EEE	420	CLR	0BYTE		
7E04	308840	40	7E5A	3F	300	0SUB1	CLR	7EAE	A6883E	420	LDA	62,X		
7E07	4A	40	7E5B	48	300	LSLA		7EB1	8D7E5A	420	JSR	0SUB1		
7E08	20F9	40	7E5C	56	300	RORB		7EB4	8D7E5A	420	JSR	0SUB1		
7E09	B67EEC	50	7E5D	49	300	LSLA		7EB7	8D7E5A	420	JSR	0SUB1		
7E0D	3086	50	7E5E	C100	300	RORB		7EB8	8D7E5A	420	JSR	0SUB1		
7E0F	39	50	7E5F	2707	300	CMR	#0	7EBD	A6883F	420	LDA	63,X		
7E10	B07DF1	100	7E61	2707	300	050	050	7EC0	8D7E5A	420	JSR	0SUB1		
7E13	108E0C00	100	7E63	F67EEE	300	LDB	0BYTE	7EC3	8D7E5A	420	JSR	0SUB1		
7E17	8620	110	7E66	59	300	RORB		7EC6	8D7E5A	420	JSR	0SUB1		
7E19	E680	110	7E67	3C	300	INCB		7EC9	8D7E5A	420	JSR	0SUB1		
7E1B	E780	110	7E68	2004	300	BRA	002	7ECC	FA7EEF	420	ORB	0BYTE1		
7E1D	4A	110	7E6A	F67EEE	300	000	LDB	0BYTE	7EDF	E780	420	STB	,Y+	
7E1E	26F9	110	7E6D	59	300	RORB		7ED1	7A7EEB	430	DEC	0COLUMNS		
7E20	308820	110	7E6E	56	300	0B2	STB	0BYTE	7ED4	2693	430	BNE	0901	
7E23	108C2400	110	7E71	39	300	RTS		7ED6	308840	430	CMR	#9216		
7E27	25EE	110	7E72	108E0C00	400	030URSHSCREEN	LDA	#3072	7EDD	25A5	430	BLO	0502	
7E29	B7FFDE	120	7E76	8E00E8	400	LDA	033000	7EDF	B7FFDE	430	STA	0FFDE		
7E2C	B6FF03	120	7E79	B6FF03	400	LDA	65203	7EE2	B6FF03	430	LDA	65283		
7E2F	8A01	120	7E7C	84FE	400	ANDR	0254	7EE3	8A01	430	ORA	#1		
7E31	B7FF03	120	7E7E	B7FF03	400	STA	65203	7EE7	B7FF03	430	STA	65283		
7E34	39	120	7E81	B7FFDF	400	STA	0FFDF	7EE9	39	430	RTS			
7E35	B07DF1	200	7E84	8520	400	0502	LDA	032	7EEB	00	430	STB	,Y+	
7E38	108E0C00	200	7E86	B77EEB	400	STA	0COLUMNS	7EEC	00	600	0COLUMNS	FCC	0	
7E3C	8620	210	7E89	A680	410	0501	LDA	,X+	7EE0	00	600	0NY	FCC	0
7E3E	E680	210	7E8B	7F7EEE	410	CLR	0BYTE	7EEE	00	600	0BYTE	FCC	0	
7E40	E780	210	7E8E	8D7E5A	410	JSR	0SUB1	7EEF	00	600	0BYTE1	FCC	0	
7E42	4A	210	7E91	8D7E5A	410	JSR	0SUB1	7EF0	00	1000	END	0FINDMAP		
7E43	26F9	210	7E94	8D7E5A	410	JSR	0SUB1							
7E45	308820	210	7E97	8D7E5A	410	JSR	0SUB1							
			7E9A	A680	410	LDA	,X+							

Listing 1

```

10 CLEAR200,32240:PCLEARB:P MODE4,1:
   SCREEN1,0:LOAD"PADCODE.BIN":LOA
   D"BIGSCREE.BIN"
20 CD=&H7E35:CU=&H7E10:SQ=&H7E72:X6
   4=&H7EEC:Y64=&H7EED
30 DIM AR(1536),AB(250),L$(36):GOSU
   B1350
40 GOSUB820
50 P1=&H7F65:P2=P1+1:P3=P2+1:P4=&H7
   F6E:P5=P4+1:P6=P5+1:P7=&H7F7C:P
   8=&H7F74:PX=&H7FC2:PY=&H7FC4
60 GOT0570
70 A$=INKEY$:IFA$=""THEN EXEC32501:
   GOT070
80 VIF A$="0"THENGOSUB830:GOT070 ELS
   E GOSUB820
90 IF A$(<)CHR$(95) THEN 120
100 EXEC CU:A=PEEK(Y64):A=A-8:IF A<
   0 THEN A=0
110 POKE Y64,A:EXEC CD:GOSUB820:GOT
   070
120 IF A$(<)CHR$(91) THEN 150
130 EXEC CU:A=PEEK(Y64):A=A+8:IF A>
   192 THEN A=192
140 POKE Y64,A:EXEC CD:GOSUB820:GOT
   070
150 IF A$(<)CHR$(21) THEN 180
160 EXEC CU:A=PEEK(X64):A=A-1:IF A<
   0 THEN A=0
170 POKE X64,A:EXEC CD:GOSUB820:GOT
   070
180 IF A$(<)CHR$(93) THEN 210
190 EXEC CU:A=PEEK(X64):A=A+1:IF A>
   32 THEN A=32
200 POKE X64,A:EXEC CD:GOSUB820:GOT
   070
210 IF A$="Z" THEN EXEC &H7E72:EXEC
   41194:EXEC CD:GOT070
220 IFA$(">")S"THEN310 ELSE SOUND100
   ,1
230 A$=INKEY$:IFA$="B"THEN 240 ELSE
   IF A$="S"THEN 860 ELSE 230
240 CLS:PRINT@12,"SAVE BIGSCREEN,":
   PRINT:PRINT:INPUT"SCREEN TITLE
   (*** TO QUIT)":A$:IF A$="****"
   THEN SCREEN1,0:GOT070
250 A$=LEFT$(A$,7)
260 POKE X64,0:POKEY64,0:EXECCD:SAVE
   A$+"1",3072,9216,41194
270 POKE X64,32:EXEC CD:SAVE A$+"2"
   ,3072,9216,41194
280 POKEY64,192:EXEC CD:SAVE A$+"3"
   ,3072,9216,41194
290 POKE X64,0:EXEC CD:SAVE A$+"4",
   3072,9216,41194
300 SCREEN1,0:GOT070
310 IF A$(">")L"THEN 400 ELSE SOUND10
   0,1
320 A$=INKEY$:IFA$="B"THEN330 ELSE
   IF A$="S"THEN 860 ELSE 320
330 CLS:PRINT@12,"LOAD BIGSCREEN,":
   PRINT:PRINT:INPUT"ENTER TITLE (
   **** TO QUIT)":A$:IF A$="****"
   THEN SCREEN1,0:GOT070
340 A$=LEFT$(A$,7)
350 LOAD A$+"1.BIN":POKE X64,0:POKEY
   64,0:EXEC CU
360 LOAD A$+"2.BIN":POKE X64,32:EXEC
   CU
370 LOAD A$+"3.BIN":POKE Y64,192:EX
   EC CU
380 LOAD A$+"4.BIN":POKE X64,0:EXEC
   CU
390 SCREEN1,0:A$="Z"(GOTO 210
400 IF A$="C"THEN SOUND100,1:GET(0,
   0)-(255,191),AR,G:SOUND100,1:GO
   T070
410 IF A$="R"THEN SOUND100,1:PUT(0,
   0)-(255,191),AR,PSET:SOUND100,1
   :GOT070
420 IFA$="G"THEN640
430 IFA$="P"THEN PQ=0:GOT0740 ELSE
   IF A$="B"THENPQ=1:GOT0740
440 IF A$=CHR$(12) THEN PCLS0:GOT07
   0
450 IF A$="M" THEN 870
460 IF A$=CHR$(3) THEN STOP
470 BF=0:IF A$=CHR$(8) THEN BX=BX-8
   :BF=1 ELSE IF A$=CHR$(9) THEN B
   X=BX+8:BF=1
480 IF A$=CHR$(10)THEN BY=BY+8:BF=1
   ELSE IF A$=CHR$(94) THEN BY=BY
   -8:BF=1
490 IF BF=1 THEN GOSUB590
500 IF A$="D" THEN 920
510 IF A$="W" THEN 1020
520 IF A$="A" THEN 1230
521 IF A$(">")F" THEN 530
522 GOSUB820:LINE(BX, BY)-(BX+255-MX
   ,BY+191-MY),PSET,B
523 FOR A=BX TO BX+255-MX STEP (256
   -MX)/8:LINE(A, BY)-(A, BY+191-MY)
   ,PSET:NEXT A
524 FOR A=BY TO BY+191-MY STEP (192
   -MY)/8:LINE(BX, A)-(BX+255-MX, A)
   ,PSET:NEXT A
525 EXEC 41194:GOSUB830:GOT070
530 IF VAL(A$)=0THEN 70
540 ON VAL(A$)GOTO 550,560,570,580
550 POKEP1,18:POKEP2,18:POKEP3,18:P
   OKEP4,18:POKEP5,18:POKEP6,18:MX
   =0:MY=0:GOSUB590:GOT070
560 POKEP1,68:POKEP2,18:POKEP3,18:P
   OKEP4,68:POKEP5,18:POKEP6,18:MX
   =128:MY=95:GOSUB590:GOT070
570 POKEP1,68:POKEP2,68:POKEP3,18:P
   OKEP4,68:POKEP5,68:POKEP6,18:MX
   =192:MY=143:GOSUB590:GOT070
580 POKEP1,68:POKEP2,68:POKEP3,68:P
   OKEP4,68:POKEP5,68:POKEP6,68:MX
   =224:MY=167:GOSUB590:GOT070
590 IF BX>MX THEN BX=MX ELSE IF BX<
   0 THEN BX=0
600 IF BY>MY THEN BY=MY ELSE IF BY<
   0 THEN BY=0
610 A=PEEK(186)*256+PEEK(187)+BY*32
   +INT(BX/8):POKEP7,INT(A/256):PO
   KE P7+1,A-256*INT(A/256):'****RE
   SET SCREEN POINTER IN MACHINECO
   DE****
620 PUT(BX, BY)-(BX+255-MX, BY+191-MY
   ),AR,NOT:PUT(BX, BY)-(BX+255-MX,
   BY+191-MY),AR,NOT:RETURN
630 RETURN
640 POKEP8,57:GOSUB820
650 GOSUB1220:AX=X:AY=Y:GOSUB830:LI
   NE(AX, AY)-(AX, 191),PSET:LINE(AX
   ,AY)-(255, AY),PSET

```

```

660 A$=INKEY$:IF A$=""THEN 650
670 IF A$="Q"THEN POKEP8,18:GOSUB830
    0:GOTO70
680 IF A$<>CHR$(13)THEN 650 ELSE SO
    UND100,1
690 GOSUB1220:GOSUB830:LINE(X,AY)-(
    X,Y),PSET,B
700 A$=INKEY$:IF A$="Q"THEN POKEP8,1
    8:GOSUB830:GOTO70
710 IF A$<>CHR$(13)THEN 690
720 SOUND100,1:IFABS((X-AX)*(Y-AY))
    >10000THEN SOUND10,1:SOUND10,1:
    GOTO690
730 GOSUB830:GET(AX,AY)-(X,Y),AB,G:
    POKEP8,18:AX=ABS(X-AX):AY=ABS(Y
    -AY):GOTO70
740 POKEP8,57:GOSUB820
750 GOSUB830
760 GOSUB1220
770 IF PQ=0THEN PUT(X,Y)-(X+AX,Y+AY
    ),AB,PSET ELSE PUT(X,Y)-(X+AX,Y
    +AY),AB,OR
780 A$=INKEY$:IF A$<>CHR$(13)THEN GO
    SUB830
790 IF A$="Q"THEN POKEP8,18:GOTO70
800 IF A$<>CHR$(13)THEN 760
810 POKEP8,18:GOTO70
820 FORA=1TO4:PCOPYA TO A+4:NEXT:RE
    TURN
830 FORA=1TO4:PCOPYA+4 TO A:NEXT:RE
    TURN
840 CLS:PRINT@5,"*** SAVE SCREEN
    ***":PRINT:PRINT"READY DISC FO
    R SCREEN DATA"
850 INPUT"ENTER NAME FOR SCREEN SAV
    E FILE ":A$:SAVE A$,3072,9216,0,
    :SCREEN1,0:GOTO70
860 CLS:PRINT@5,"*** LOAD SCREEN *
    ***":PRINT:PRINT"READY DISC TO
    LOAD DATA":INPUT"SCREEN TITLE":
    A$:LOAD A$+ ".BIN":SCREEN1,0:GOT
    O70
870 CLS:PRINT@6,"GRAPHIC PAD ARTIST
    ":PRINT:PRINT"1-4...SIZE OF SC
    REEN.":PRINT"0....OOPS! DELETE
    LAST ACTION. C....COPY SCREEN
    TO HIGH MEMORY":
880 PRINT"R....RESTORE RESERVE SCR
    EEN.":PRINT"G....GET SCREEN AR
    RAY.":PRINT"P....PUT ARRAY ON
    SCREEN (PSET)B....PUT ARRAY ON
    SCREEN (BOTH)Q....QUIT CURREN
    T ROUTINE."
890 PRINT"SS/LS.SAVE/LOAD DISPLAY S
    CREEN. SB/LB.SAVE/LOAD BIG 24K
    SCREEN. M....DISPLAY MENU LIST
    ":PRINT"W....DRAW LINE/BOX/CI
    RCLE":PRINT"A....DRAW ALPHABET
    ON SCREEN. F....FRAME A GRID
    ON SCREEN.":
900 A$=INKEY$:IF A$=""THEN 900
910 SCREEN1,0:GOTO80
920 POKEP8,57:GOSUB820:CLS:PRINT@12
    8,"":INPUT"DO YOU WANT CIRCLES
    (Y/N)":A$:IF LEFT$(A$,1)<>"Y"
    THEN 960
930 INPUT"WHAT SIZE OF CIRCLE":RAD:
    SCREEN1,0
940 IF INKEY$="Q" THEN POKEP8,18:SO
    UND100,1:GOTO70
950 GOSUB1220:IF PEEK(&H7FC5)<255 T
    HEN CIRCLE(X,Y),RADIUS,1:GOTO 9
    40 ELSE GOTO940
960 PRINT"*** LINES/BOXES ***":INPU
    T"X OFFSET":A:INPUT"Y OFFSET":B
970 INPUT"LINES OR BOXES (L/B)":A$:
    IF LEFT$(A$,1)="L" THEN PQ=0:SC
    REEN1,0 ELSE PQ=1:SCREEN1,0
980 IF INKEY$="Q" THEN POKEP8,18:SO
    UND100,1:GOTO70
990 GOSUB1220:IF PEEK(&H7FC5)=255 T
    HEN 980
1000 IF PQ=0 THEN LINE(X-A,Y-B)-(X+
    A,Y+B),PSET ELSE LINE(X-A+Y-B)-
    (X+A,Y+B),PSET,B
1010 GOTO980
1020 CLS:PRINT@12,"DRAW SHAPES.":PR
    INT:PRINT:INPUT"LINE/BOX/CIRCLE
    ":A$:A$=LEFT$(A$,1)
1030 IF A$="L" THEN SHAPE=1
1040 IF A$="B"THEN SHAPE=2 ELSE SHA
    PE=3
1050 SCREEN1,0
1060 POKEP8,57:GOSUB820
1070 GOSUB1220
1080 A$=INKEY$:IF A$="Q"THEN GOSUB8
    30:POKEP8,18:GOTO70
1090 LINE(X,0)-(X,191),PSET:LINE(0,
    Y)-(255,Y),PSET
1100 IF A$=CHR$(13) THEN GOSUB830:S
    OUND100,1:AX=X:AY=Y:GOTO1120
1110 GOSUB830:GOTO1070
1120 GOSUB1220
1130 A$=INKEY$:IF A$="Q"THEN POKEP8,
    18:GOSUB830:GOTO70
1140 GOSUB830
1150 ON SHAPE GOTO 1160,1170,1180
1160 LINE(AX,AY)-(CX,Y),PSET:GOTO119
    0
1170 LINE(AX,AY)-(X,Y),PSET,B:GOTO1
    190
1180 CIRCLE(AX,AY),SQ((AX-X)^2+(AY
    -Y)^2)
1190 IF A$=CHR$(13) THEN GOSUB820:S
    OUND100,1:GOTO1120
1200 IF A$="Q" THEN POKEP8,18:SOUND
    100,1:GOSUB 830:GOTO70
1210 GOTO1120
1220 POKE&H7FC5,255:EXEC32501:IF PE
    EK(&H7FC5)=255 THEN RETURN ELSE
    X=PEEK(&H7FC3)+BX:Y=PEEK(&H7FC
    5)+BY:RETURN
1230 CLS:PRINT@6,"DRAW ALPHABET":PR
    INT:INPUT"WHAT SCALE TO DRAW (1
    -16)":A:IF A>16 OR A<1 THEN 1230
    ELSE A=A*4
1240 DRAW"S"+STR$(A)
1245 INPUT"ENTER ANGLE OF LETTERING
    (0-3) ":AN:IF AN<0 OR AN>3 TH
    EN 1245
1250 SCREEN1,0:GOSUB820
1260 GOSUB1220:LINE(0,Y)-(255,Y),PS
    ET:LINE(X,0)-(X,191),PSET
1270 A$=INKEY$:IF A$=""THEN GOSUB83
    0:GOTO 1260
1280 GOSUB830:DRAW"BM"+STR$(X)+", "+
    STR$(Y):GOTO1300
1290 A$=INKEY$:IF A$=""THEN 1290
1300 IF A$=CHR$(13) THEN POKEP8,18:

```

```

SOUND100,1:GOTO70
1310 A=ASC(A#):IFA>47 ANDA<58 THENA
=A-48 ELSEIFA>64AND A<91 THENA=A-
54
1320 IFA>36 THEN1290
1330 IF A#=" " THEN DRAW"A"+STR$(AN)
+"BR10":GOTO1290
1340 A#=L$(A):DRAW"A"+STR$(AN)+"XA#
":GOTO1290
1350 L$(11)="U4E2F2D2L4R4D2BR4"
1360 L$(12)="R3L2U6LR3FDGL2R2FDGBR5
"
1370 L$(13)="BRR2EGL2HU4ER2FB05BR4"

1380 L$(14)="R3L2U6LR3FD4GRR5"
1390 L$(15)="R4L4U3R3L3U3R4BD6BR4"
1400 L$(16)="U3R3L3U3R4BD6BR4"
1410 L$(17)="BRR2L2HU4ER2FB03LR2LD2B
R5"
1420 L$(18)="U6D3R4U3D6BR4"
1430 L$(19)="BRRU6LR2LD6BR5"
1440 L$(20)="BUFREU5LR2BD6BR4"
1450 L$(21)="U6D4E4G3F3BR4"
1460 L$(22)="U6D6R4BR4"
1470 L$(23)="U6F2DUE2D6BR4"
1480 L$(24)="U6DF4U5D6BR4"
1490 L$(25)="BRR2L2HU4ER2FD4GRR5"
1500 L$(26)="U3R3L3U3R3FDG6D3BR5"
1510 L$(27)="BRRLHU4ER2FD3G2EHF2BR4
"
1520 L$(28)="U6R3FDGL3RF3BR4"
1530 L$(29)="BUFR2EU4L2HUERR2FB05BR4
"
1540 L$(30)="BR2U6L2R4BD6BR4"
1550 L$(31)="BRR2L2HU5BR4D5GRR5"
1560 L$(32)="BR2UHUHU2BR4D2GD6BR5"

1570 L$(33)="E2UDG2U6BR2BD4F2U6D6BR
4"
1580 L$(34)="UE2H2UBR4DG2F2D6BR4"
1590 L$(35)="BR2U3H2UBR4DG2D3BR6"
1600 L$(36)="R4L4UE4UL4R4BD6BR4"
1610 L$(0)="BUU4ER2FG4FR2EU4BD5BR4"

1620 L$(1)="BRRU5LAUD6BR5"
1630 L$(2)="R4L4UE2REUHL2GBR8BD5"
1640 L$(3)="BUFR2EU4LE2UL4BR8BD6"
1650 L$(4)="BU3R4L4E3D6BR5"
1660 L$(5)="R3EU2HL3U2R4BR4BD6"
1670 L$(6)="BUU2R3FHL3UE2R2BD4DGL2H
FBR7"
1680 L$(7)="UE4UL4BR8BD6"
1690 L$(8)="BUUER2L2HUER2FDGFDGL2HF
BR7"
1700 L$(9)="BU4UER2FD2L3HFR3DG2L2BR
8"
1710 RETURN
1720 '(C) 1986 BY PETER WHITTAKER

```

Listing 2 Hex-Loader

```

10 'HEX LOADER FOR 'WORDPROC' MEMOR
Y DUMP. BY PETER WHITTAKER
20 INPUT"START ADDRESS";START
30 INPUT"FINISH ADDRESS";FINISH
40 FOR N=START TO FINISH STEP 8
50 PRINT N;" ";
60 TT=0:INPUT A#:Z=0
70 FOR M=1 TO LEN(A#) STEP2
80 L=VAL("&H"+MID$(A#,M,2))
90 TT=TT+L:POKEN+Z,L
100 Z=Z+1:NEXT M
110 PRINT" = ";
120 INPUT T
130 IF T<>TT THEN PRINT"error - ENT
ER LINE AGAIN":GOTO50
140 NEXT N

```

Listing 3 Bigscreen — dump

```

10 CLEAR200,32240:PCLEAR8:PMODE4,1:
LOAD"BIGSCREE.BIN"
20 CD=&H7E35:CU=&H7E10:SQ=&H7E72:X6
4=&H7EEC:Y64=&H7EED
30 SCREEN1,0
40 PRINT#-2,CHR$(8);CHR$(13);
50 '***** GET PICTURE *****
60 CLS:PRINT@128,"LOAD BIGSCREEN TO
HIGH MEMORY.":PRINT:INPUT"ENTE
R SCREEN TITLE":A#:A#=LEFT$(A#,
7)
70 LOAD A#+"1.BIN":POKEX64,0:POKEY64
,0:EXECCU
80 LOAD A#+"2.BIN":POKEX64,32:EXECCU
90 LOAD A#+"3.BIN":POKEY64,192:EXEC
CU
100 LOAD A#+"4.BIN":POKEX64,0:EXEC CU
110 '*****PRINT OUT LOOP *****
120 POKE65283,PEEK(65283)AND254:'D
ISABLE INTERRUPTS
130 Q=255:GOSUB180
140 POKE&H7DFD,&HC1:POKE&H7DFE,&HAB
:Q=119:GOSUB180
150 PRINT#-2,CHR$(13);CHR$(15)
160 POKE65283,PEEK(65283)OR1
170 STOP
180 FOR Y=0 TO Q STEP 7
190 POKEX64,32:POKE Y64,Y:EXECCD:PC
OPY 1 TO 5:POKEX64,0:EXECCD:PCO
PY5 TO 2:'PULL DOWN TOP LINE O
F GRAPHICS.
200 FORX=0 TO 255:Z=PPOINT(X,0)+PPO
INT(X,1)*2+PPOINT(X,2)*4+PPOINT
(X,3)*8+PPOINT(X,4)*16+PPOINT(X
,5)*32+PPOINT(X,6)*64+128:PRINT
#-2,CHR$(Z):NEXT X
210 FOR X=0 TO 223:Z=PPOINT(X,48)+P
POINT(X,49)*2+PPOINT(X,50)*4+PP
OINT(X,51)*8+PPOINT(X,52)*16+PP
OINT(X,53)*32+PPOINT(X,54)*64+1
28:PRINT#-2,CHR$(Z):NEXT X
220 NEXT Y
230 RETURN
240 '(C) 1986 BY PETER WHITTAKER.

```

Expert's Arcade Arena

Write to 'The Expert' at Dragon User
12-13 Little Newport St, London WC2H 7PP.
with all your arcade tips and hints.

GOOD DAY to all you good people and welcome to this, the third column. Yes, already this is a part of history. There have been so many letters that my entire house is packed with them. My postman has a hernia. My lover has left because she can't get into the bedroom for letters. On a scale of large to small this postbag would not be anywhere near small.

But, loyal to you as I am, I have read every one of them and tested some of the pokes, and tried out the maps, and basically worked my rocks off so that you, my loving, adoring, readership have this column here for you.

So, to business, first of all some news: some of you may be aware that Blaby have released a game similar to Atic-Atak. Well, you will soon have a choice between that, and a version of the same by Microdeal. Having seen both I can simply say that the Microdeal one is closer to the original but the Blaby one is more of an adventure (ie certain objects are needed to pass certain locations). I won't recommend one above the other, no doubt the reviewers will do that for me, but I can say that I have no preference between them at the moment from the limited time I've played them.

Moving rapidly to your letters, first a big thank you for all the Jet-Set Willy maps. I have decided that the one published was the best of them as it contained a lot of relevant information in a clear table as well as a simple map.

Thank you to C. A. Smith, M. R. Vine, D. R. Gardener, Mark Bowen, Gavin Long, and Michael Ellison for their maps and also to anyone else who has sent one which I may have not received by copy deadline.

Now then, to some specific points. Mark Bowen of Kent writes with the following pokes:

Ninja Warrior — Load up the game, type POKE 9489, N (where N is the number of lives) then type EXEC.

Mark says he has still got no further than level 4 and that we have not reviewed it. Well, Mr Mark Know-all Bowen if you take a look through your back issues to the issue dated October 1983 you will find John Scriven's review which, for those not born then, I shall re-present (in glorious non-

technicolour) here:

"My award for the most original game of the month has to go to Ninja Warrior from Programmer's Guild. In this excellent game, you, and up to five other players, control some figure wearing a judo suit. The ground scrolls beneath his feet, and you can use a joystick to slow him down, speed him up, or make him jump in the air. The "fire" button controls a sharp karate kick that he performs.

"To gain a white belt, the landscape is littered with boulders that he can jump over, but a higher score is achieved by kicking them to dust. If he survives with toenails intact the test for higher grade belts present him with fires to jump over, pits to traverse, and even arrows to catch. Eventually (so they tell me!), your warrior becomes a black belt. For me this was a highly entertaining game using a novel idea, smooth graphics, and good sound. I hope future programs from Programmer's Guild will be as good."

I believe Computape are now the sole suppliers of Ninja Warrior but I'm sure that you will correct me if I'm wrong. Personally, I'm quite a fan of the game although my friends all find it rather boring! I have nudged the *Dragon User* office into giving it a re-review so expect one soon. My ratings stand at the end of this month's column.

Mark goes on thus:

"Do you know if Design Design are planning any new games?" — No, I don't, but I'll find out for you — "Is anyone any good at Dark Star?" — Yes, I am — "and if so how?" — I suppose I'm just brilliant.

"... It is about time you started this arcade arena. It is always claimed that your magazine must mediate between games and serious applications but there are always twice as many advertisements for games than serious applications so why not twice as much Editorial? The point I am making is that your column should cover two or three pages..."

I agree with Mark but I'd like to know how you feel about it. Write to the usual address clearly marking your letters "The Expert".

Mark concludes by suggest-

ing that my style is very similar to that of Jason Orbaum (one of the reviewers). An interesting concept Mark, complete rubbish, but interesting nonetheless, and it has led me to spark off a "Who is The Expert?" competition. Yes, send your guesses as to who I might be to the top address and the most interesting and amusing suggestion each month will win a prize worth absolutely NOTHING! I'll give you a clue to push you in the right direction:

I AM NOT NECESSARILY HUMAN.

Right, that's the competition set up, now here's a cry for help from Matthew Fasham of Hindhead, he would like to know how to do the last screen in Fantasy Fight... Write if you have a foolproof method.

I'd like some more maps from you all please, games I'm interested in this time are "Fantasy Fight", "The Dark Pit" and "The Wizard's Lair". Send them to the same address as usual please.

D Flintham of Burnley suggests I publish his hi scores saying he hopes I use a full or half page to publish them because it gives people some-

thing to beat. Well, I'm quite adamant to refuse for the following reasons:

(1) I have no way to verify the scores or prove that they were not obtained on hacked versions of games.

(2) I don't really believe that people are interested in reading other people's hi scores, publishing them just serves to massage some probably already overlarge egos.

(3) There is, in my mind, no such thing as healthy competition. The idea of the column is not to find superiors but to co-ordinate with each other to create a healthy environment in which we all share. My function is that of a co-ordinator, albeit a highly talented one! Think of this as a computer kibbutz!

That's about it for this month. Please keep writing, I have bought myself a warehouse to store your letters in so I'm all set now! See you next month with lot of pokes and some interesting ideas on Stereotyping you might like to mull over... and I promise we'll be back to the stupid humour again as well. I don't know how you can wait!

	G	P	A	V
Ninja Warrior (Programmer's Guild)	6	8	10	9
Ruby Robba (Blaby)	7	8	8	8
Pub Crawl (B & H)	5	7	6	6
Grabber (Microdeal)	6	9	7	8
Superbowl (Cable)	4	4	0	3

The Mansion of Jet Set Willy

1. THE BATHROOM
2. THE OBSERVATORY
3. NOMEN LUNI
4. UPON THE ROOF
5. UPON THE BATTLEMENTS
6. THE WATCH TOWER
7. WE MUST PERFORM A QUIRKAFLEEG
8. I'M SURE I'VE SEEN THIS BEFORE
9. RESCUE ESMERELDA
10. TOP OF THE HOUSE
11. CONSERVATORY ROOF
12. UNDER THE ROOF
13. THE ATTIC
14. DR. JONES WILL NEVER BELIEVE THIS
15. THE GAMES ROOM
16. EMERGENCY GENERATOR
17. PRIEST'S HOLE
18. ABOVE WEST BEDROOM
19. ABOVE WEST WING

The MANSION


of -----

Jet Set Willy

KEY:

3 = number of items

• = leads to The Bathroom

 = Entrance to Hades!
Do not enter!

Σ = Swing rope

- 20. ORANGERY
- 21. A BIT OF TREE
- 22. MASTER BEDROOM
- 23. TOP LANDING
- 24. HALFWAY UP EAST WALL
- 25. WEST BEDROOM
- 26. WEST WING
- 27. SWIMMING POOL
- 28. BANYAN TREE
- 29. NIGHTMARE ROOM
- 30. GUEST ROOM
- 31. FIRST LANDING
- 32. THE CHAPEL
- 33. EAST WALL BASE
- 34. OUT ON A LIMB

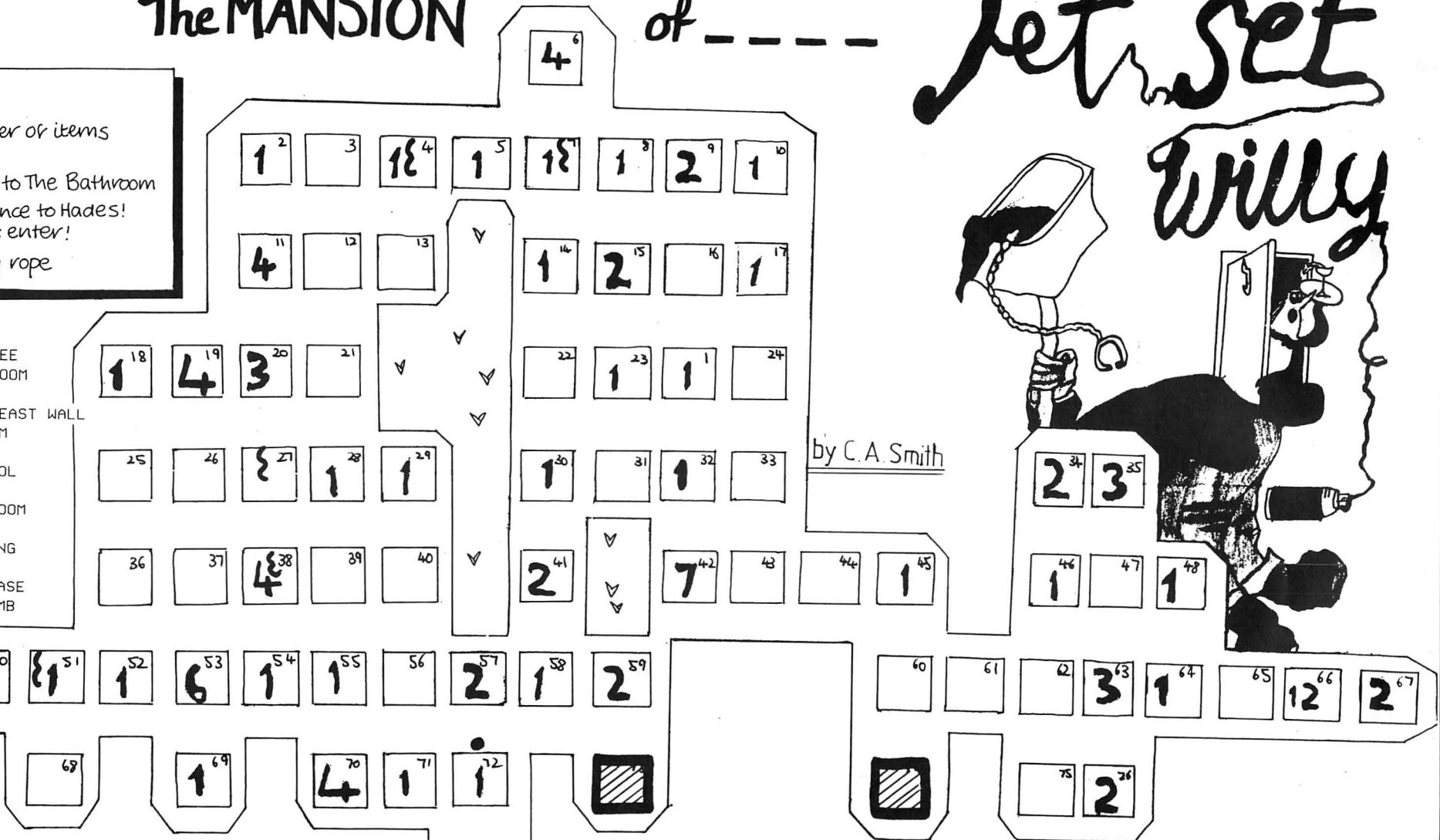
- 35. TREE TOP
- 36. BACK DOOR
- 37. BACK STAIRWAY
- 38. COLD STORE
- 39. WEST OF KITCHEN
- 40. THE KITCHEN
- 41. TO THE KITCHENS/MAIN STAIRWAY
- 42. BALLROOM WEST
- 43. BALLROOM EAST
- 44. THE HALL
- 45. FRONT DOOR

- 46. ON A BRANCH OVER THE DRIVE
- 47. INSIDE MEGATRUNK
- 48. CUCKOO'S NEST
- 49. THE BOW
- 50. THE YACHT

- 52. TOOL SHED
- 53. THE WINE CELLAR
- 54. FORGOTTEN ABBEY
- 55. MATTHEW'S NEXT GAME
- 56. AT THE TOP OF THE WELL
- 57. HALL OF MIRRORS
- 58. JIM'S NASIUM
- 59. THE TRIBBLE HUTCH

- 60. SECURITY GUARD
- 61. THE GARDEN
- 62. THE DRIVE
- 63. AT THE FOOT OF THE MEGATREE
- 64. UNDER THE MEGATREE
- 65. THE BRIDGE
- 66. THE OFF LICENCE
- 67. THE PUB
- 68. SECRET PASSAGE

- 69. SMUGGLER'S CAVE
- 70. THE OLD MINE WORKINGS
- 71. IN THE WELL
- 72. THE DRAIN
- 73. ENTRANCE TO HADES!!!
- 74. ENTRANCE TO HADES!!!
- 75. UNDER THE DRIVE
- 76. TREE ROOT
- 77. ENTRANCE TO HADES!!!



by C. A. Smith





MIKE GERRARD'S ADVENTURE TRAIL

LET'S BEGIN with details of another freebie — there, that should get everyone's attention. With the help of a solution from Simon Hargrave of Crawley Hill Farm, Uley, Dursley, Glos. GL11 5BH, I've prepared a handout on *Trekboer*, so if you want a copy of that send in the usual s.a.e. and your wish will be my command.

One reader wrote in asking what were the various handouts available, so time for an up-date on those, methinks. Firstly I've got a clue sheet for *Madness and the Minotaur*, as originally supplied by Dragon Data to anyone who wrote in with queries on that game. I've also got a copy of the notes that were on the cassette inlay card for *El Diablero*, as copies of this adventure now tend to be sold without the inlay, and the notes on it really do help you get started on what is a difficult game. Finally I've got solutions to *The Cricklewood Incident*, *Fishy Business* and *Franklin's Tomb*. If you want copies of those then you only need send in a *small* s.a.e. — some readers send me envelopes you could fit an elephant in. For your information, I have the handouts on file on disc and simply print one out on A4 paper whenever I get a request for one.

A reader from Swansea, whose name I won't give in case he gets inundated with similar requests, decided to provide his own freebies. This reader used to be a tester for Salamander, and had spare copies of *White Cliffs of Dover* and *Franklin in Wonderland*, which he sent to S. Goodman who'd been asking about the games in an earlier column. Thank you for that, and for the information that before loading either game you must POKE 25,6: NEW to create the extra memory both programs require. (And thanks to Mrs Fitzgerald of Abergele who phoned the office with the same information.)

Madness

S. J. Edwards from 6 Barnfield, New Malden, Surrey KT3 5RH says, "Congratulations on producing the best adventure column in any magazine." Well, shucks, one does one's best, and I'd like to take this opportunity to thank my editor (whoever it is), my co-stars, my producer, my . . . (rest of speech deleted.) Anyway, what S. J. Edwards says is that he's having difficulty tracking down copies of the following and would be interested to hear from anyone keen to sell or swap *Madness and the*

Minotaur, *Dragon Mountain*, *Calixto Island*, *Black Sanctum*, *Adventures Trilogy*, *Viking*, *Monsters and Magic* and several titles that Touchmaster are now apparently sold out of: *Final Countdown*, *Mansion of Doom*, *Stalag/Eno*, *Poseidon Adventure* and *Cimmeron Moon*. He also wants, though they're not adventure, *Dragon Forth*, *Logo*, and *Dragon DOS*.

Help on a few titles is offered by Douglas Field, 14 Lawnswood, Hessle, N. Humber-side HU13 0PT, the titles being *Keys of the Wizard*, *Fun House* and *Pirate Adventure*. In return he asks if anyone knows where he can buy some cut-price adventures for his 32k Tandy Coco. Any offers?

Help

Peter Williamson of 37 Battenhall Road, Worcester WR5 2BQ is also trying to do me out of a job and offering help to anyone stuck on *Juxtaposition*, while Mark Gadsby has completed *Black Sanctum*, *Calixto Island*, *Eno*, *Death Mines of Sirus* and *Shenanigans*, and offers help on any of those. Don't forget the s.a.e. when writing to any reader for help, of course. Mark wants to know if anyone has come across any adventures in French or German, so he can combine his favourite hobby with his 'O' level revision. A nice trick, Mark, and if anyone can help him get away with it write to Mark Gadsby, 157 Pinewood Park, Cove, Farnborough, Hants GU14 9LE.

If you were studying Italian, Mark, you could have tried contacting Marco Foedda of Via San Rocco 9, cap 37125 Verona, Italy. Marco wrote to say that after three months of difficulties he eventually finished "the fantastic *El Diablero*." I think the post had difficulties, too, as Marco wrote in January and the letter arrived in April. Still, he offers help to anyone stuck in the adventure, or if you just fancy contacting an Italian Dragon owner, why not write?

Christopher Bayne from St Albans wrote about various things, including the suggestion that to make more space for the actual column we should remove the large heading and also refrain from printing cassette covers and other illustrations on the page. Personally I think a solid page of text would look pretty boring, but has anyone else any strong views on that? Christopher also suggests that a few notes for beginners should be made available, so leaving even more room in the actual column for product

reviews and clues. If there's sufficient demand from beginners for that, then I'll try to do something about it.

To keep Christopher happy, then, I'd better get on with some clues, like these from Stuart Estell of Birmingham. In *Ice Kingdom*, to kill Harkon: YRUOMRA MORF DLEIHS AND DROWS ESU. To escape the dungeon: NAMWONS RAEN ECI MORF NIOC ESU. In *Towers of Death*, to kill Medusa: RORRIM TNIOP. The order in which to move the armour: EERTH OWT OWT ENO.

A few clues on *Trekboer* from Matthew Norman of Edmonton. To cross the force field: HPATONEC MORF TELUMA YRRAC. To remove grate: TI REVO DICA RUOP. More help from a reader in Denby Dale who forgot to sign his or her name. On *Franklin's Tomb*, to stop the water in the aquarium: 'ELOH-GULP' EPYT DNA GULP DNIF. To find the key: 'HSSMURG' YAS DNA HSSMURG EUTATS OT OG. To open sarcophagus: SRALLEC EHT MORF DIUQUL A RO HTUOM STI OTNI RETAW RUOP.

Can anyone tell Pat Perry where to dip the twig in *El Diablero*? Come to that, can anyone tell me?? Pat lives at 30 Leas Road, Mansfield Woodhouse, Notts, and I live in an old shoebox in the corner of the *Dragon User* office.

Code

Andrew Hill has got a code, not in the node but in *Operation Safras*, and he's willing to pass the information on to others, particularly Justin Field who was asking about it in the April issue. The code for part 1 is 13 (ENTER), and for part 2 is TANGO. There didn't seem much point in printing those brief things backwards, so I hope nobody minds. Andrew also asked for a good adventure for a beginner, preferably with graphics — the adventure, that is, not the player. I'd have thought something like *Black Sanctum* or *Sea Quest* would fit the bill, both with graphics, both enjoyable, not too difficult for the experienced player but good for the beginner in that all the problems are fairly logically solved and the scale of the games isn't so big that you get lost wandering down endless corridors and through mazes.

Gavin Griffin has already had a mention in the column, but somehow his address came out wrongly so I'll try again: 58 Old

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Bawn, Park Tallaght, Co. Dublin, Ireland. That's what it looks like, anyway, but as Gavin's handwriting is a mix of upper and lower case it's a bit tricky to read. Letters will reach him anyway, I'm sure, and the reason for writing is that Gavin does like hearing from other readers, and can help with *Shenanigans* (not surprisingly), *Juxtaposition*, *Calixto Island*, *Black Sanctum*, *Keys of the Wizard*, *Madness and the Minotaur* and most of *Trekboer*. Gavin kindly sent me a map of the lands of *Juxtaposition*, which he asked us to print, but the quality of the photocopy isn't good enough to reproduce, I'm afraid. Gavin says we should have a pen-pals section in the Magazine — well, if enough readers want it then we'll introduce it, but as I'm always printing readers' addresses anyway, I hope you always feel free to write to each other without needing a formal introduction. So if you want an Irish pen-pal with an interest in swapping tips, pokes and adventure hints, then Gavin's your man.

Stephen Hootan (I think) of 4 Bankscroft, Langton, Preston, Lancs PR4 5AL also sent in a *Juxtaposition* map, and we will see about reproducing that as several readers have asked about one, and Stephen thinks the adventure section should be a lot longer — by at least five pages! Steady on, Stephen. Too much late-night adventuring has affected your brain, I think. What Stephen needs help on is *Mansion of Doom* and *Poseidon Adventure*. In the former, how to get across the acid to reach the coffin, and in the latter how to get across the

oil lake in level three. He also asks if anyone has hints sheets and maps of these titles. Not me, so over to you.

Nick Hodge has completed *Juxtaposition*, which he thinks every dragon owner should buy, so if you have and get stuck write to Nick at Caramic, Huntworth, Bridgewater, Somerset TA7 0AJ. Nick sent me no less than 20 clues for the game — maybe I do need an extra five pages after all.

Some people have been having co-ordination trouble in *Syzygy*, so James Bonfield of 7 Water End, Wrestlingworth, Sandy, Beds SG19 2HA to the rescue. "To enter the co-ordinates you must take the row you wish and then press the numbers and pull the lever. For example, if you

wanted to go to the planet you must type PRESS ZERO, PRESS FOUR, PRESS ONE, PRESS FIVE, PULL LEVER. The first place to go to is the planet." James also gives the other co-ordinates you need, which are 2.7-3.0 to the emerald and 1.6-0.3 to Darth Vader. James is having trouble with *Keys of the Wizard*, and adventure not many have managed to solve, and wonders: how to open the wizard's gold box; how to open the chest in the hidden temple; how to open the store box in the hidden tomb; and how to defeat the jester. If anyone has managed to put together a solution on *Keys of the Wizard*, do send it in then I can start another column by saying "Let's begin with details of another freebie."

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 Help-

line, 12/13 Little Newport Street, London WC2H 7PP. As soon as enough entries have arrived, we will start printing them in the magazine.

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

Adventure
 Problem.....

 Name
 Address.....

Adventure Contact

Adventure Castle Adventure Problem Is it possible to smash glass in north exit, if so how? How do I unstiffen the windlass? **Name** Andrew Hall **Address** 59 Wordsworth Avenue, Castle Ridge, Stafford ST17 9UE.

Adventure Seaquest Problem What do you do with the mermaid? Where do you tie the balloon to? What use is the metal detector? Where is the key? **Name** Robert Gooding **Address** 52 Tollerton Drive, Irvine, Ayrshire KA12 0QE.

Adventure Aquanaut 471 Problem I can't seem to do anything — keep going about first few locations, but can't find anything or go anywhere different. **Name** Robert Gooding **Address** 52 Tollerton Drive Irvine, Ayrshire KA12 0QE.

Adventure Juxtaposition Problem How do I get over the first balcony? Is there a hint sheet? **Name** Andrew McCallum **Address** 23 Top Cliff Court, Morley, Nr. Leeds CS27 8UG.

Adventure Trekboer Problem How do I get past the force-field? **Name** Neil Davies

Address 15 Packe Close, Feering, Colchester, Essex CO5 9LP.

Adventure Juxtaposition Problem How do you get the emerald? Where are the Deeds of Brown? **Name** Wayland Mitchell **Address** Ashleigh Farm, Gayton-le-March, Nr. Alford, Lincs LN13 0NW.

Adventure Demonkite Problem Have found dead king, long tough rope and burning torch and the full stop. (That's what it says). **Name** Conrad Evans **Address** 92 Maesglas, Cardigan, Dyfed, Wales SA43 1BE.

Adventure Trekboer Problem Can't get past the force field or get to the Great. **Name** Seth Robinson **Address** 8 Broomhouse Close, Denby Dale, West Yorks.

Adventure Black Sanctum Problem How do you get out of the forest? And everything after that? **Name** Neil Pyatt **Address** 51 Marlborough Close, Grays, Essex RM16 2SU.

Adventure Juxtaposition Problem Where's the red cete ore? Where's the spade?

Please help. **Name** Simon Jones **Address** 37 Collins Meadow, Harlow, Essex CM19 4EN.

Adventure 1) Operation Saf-ras 2) Adventure Trio **Problem** 1) Can't get past the first chapter. I can answer the questions, but not get the code. 2) Completely stuck. **Name** Anndrew Marriott **Address** 17 Goodwood Place, Trentham, Stoke-on-Trent ST4 8BO.

Adventure Wings of War **Problem** How do you get past guard with Luger in chateau? **Name** Mark Lane **Address** 11 Hampden Close, Bicester, Oxon OX6 7UG.

Adventure Juxtaposition **Problem** I can't get out of the emerald tower with the Eridani Emerald. **Name** Simon Pate **Address** 4 Alder Close, Bradley, Wrexham, Clwyd LL14 4BJ.

Adventure Operation Safras **Problem** Can only find agent number one, need help to find the others. **Name** Margaret Wardlow **Address** 21 Acacia Avenue, Chapelton, Sheffield S30 4PQ.

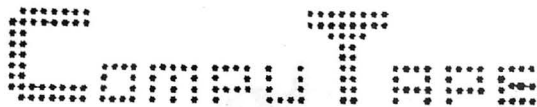
Adventure Barons of Ceti V. **Juxtaposition Problem** Where are the deeds of Brown? **Name** Steven Edington **Address** 60 Thorburn Road, Newferry, Wirral, Merseyside L62 1EW.

Adventure Juxtaposition Problem I am on street level, but I can't find the mono car. **Name** S. Monaghan **Address** 41 St Brendan's Crescent, Greenhills, Walkinstown, Dublin 12, Ireland.

Adventure Juxtaposition **Problem** I can't get past the JKL Droid. How do you get on to the planet surface? Is there a hint sheet? **Name** Howard Johnston **Address** 10 Greenhill, Alveston, Bristol BS12 2QY.

Adventure Total Eclipse **Problem** How much do you need to go to a higher tech level? **Name** D. Clubb **Address** 254 Baldwin's Lane, Croxley Green, Rickmansworth, Herts WD3 3LQ.

Adventure Return of the Ring **Problem** What do you do on the forest moon? **Name** Matthew Lovell **Address** 15 Darren Close, Cowbridge, South Glamorgan, Wales.



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Mind The Cracks

Gordon Lee hops from slab to slab in pursuit of this month's prizes — some great incentives.

LAST MONTH we took a cursory look at random numbers, including reference to the 'Dragon's' random number generating function. This, as is the case with the same command on other microcomputers, has the disadvantage of producing the same sequence of numbers when starting from cold. Clearly, if we are using this command in a program this problem needs to be overcome. An adventure type game would be of limited interest if, for example, objects were always set at the same locations and the response to specific commands were always the same. Similarly, with arcade games, moving objects that are too predictable would not provide much of a challenge!

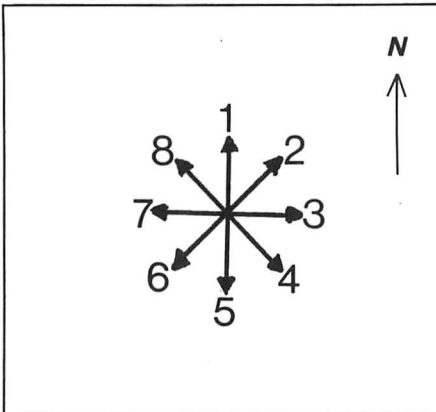
One way of overcoming this problem is to include the following lines in your program:

```
100 PRINT "PRESS A KEY TO  
CONTINUE"  
110 AS=INKEY$:X=RND(10): IF  
AS= "" THEN 110
```

The lines are numbered here 100 and 110, but they can be altered to fit anywhere in your program, preferably near the beginning, say following the title or instruction page. Using this routine, the computer will spin through its sequence of random numbers for an unpredictable period of time (until a key is pressed), and will so ensure that subsequent use of the random command will produce a truly unpredictable number.

Last month, I gave a listing for a program which used the RND function to plot a random walk on the Dragon's 32 by 16 resolution text screen. This concept of 'random walking' has received a certain amount of attention in the mathematical press. At its simplest, such a walk can be one-dimensional. Imagine that you are standing on a straight line, stretching in both directions to infinity. You toss a coin. If it falls heads, you move one step to the left; if it falls tails, you move one step to the right. By expanding this concept to two dimensions we arrive at a walk on a plane surface, like the one illustrated in last month's program. The competition this month involves taking a random walk on a much larger plane surface. Imagine a square quadrangle paved with a regular arrangement of square paving slabs, 101 slabs along each edge. The quadrangle consists of a central area of 99 by 99 white slabs, and around this is a single row of grey slabs.

Starting at the very centre square we are going to take a random walk, using a pseudo-random sequence of digits to decide on the direction of travel. This is determined by taking successive digits in the decimal part of the expression $1/17389$ which begins 0.000057507619 . . .



Each digit determines the direction in which we move, as shown in the diagram. So, for '1' move one square north, for '2' move one square diagonally north-east, and so on. The digits zero and nine are ignored whenever they occur. So we would start our journey by moving south, west, south, west, etc. The question is, at which point would we be forced to first step onto one of the grey border slabs? Please give

your answer in the form: 'North edge, 17th slab from north-west corner' — or whatever!

For collectors of mathematical trivia, the decimal value of $1/17389$ repeats in cycles of 17388 digits. Its full value was first calculated by the 19th century mathematician William Shanks, who also computed the value of π to 707 decimal places. When this value of π was examined it was found that the digit '7' occurred much less frequently than did the other digits. Scholars of the time put forward all sorts of theories as to why this should be. In fact, Shanks had made an error in his original calculation, and all digits after the 528th were incorrect. Once this had been remedied the frequency with which the ten digits occurred, balanced out, as indeed they do for even longer expansions of the value of π . In this respect, π itself would be a pseudo-random generator.

We began, last month, by linking π and random numbers so it is perhaps appropriate that we should now conclude at this point.

Prize

This month we're back in arcade country, with 20 copies of last month's five-star reviewee shooty space ships game *Moon Cresta*, courtesy of Incentive Software, as prizes. So take steps to locate the answer, and win some well-earned brain relief.

Rules

To win a prize game, you must send us the answer to the problem in the form of the location of the slab in question, and a printout (or typeout) of the program you used to solve it. No cassettes please — they won't fit in the competition box.

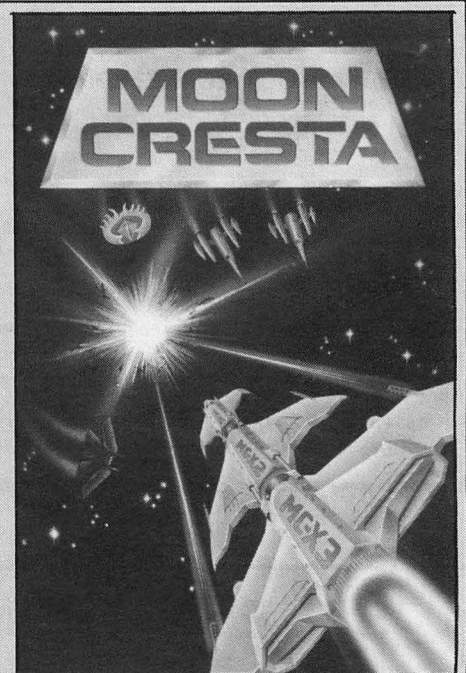
Make sure your name and address are printed clearly on your entry, and mark the outside of your envelope 'July Competition' (without which your entry will not even find the competition box).

As a tie-breaker, complete the following phrase: "The Dragon takes a giant step . . ."

Entries must reach us by the end of August, and winners will be announced in the September edition. Tie-breakers will be judged on their memorability and the editor's decision is, as usual, final.

April Winners

The 15 lucky winners will be receiving copies of *Beanstalker* from Micro Vision. They are: E. A. Newman of Addlestone, M. J. Stentiford of Kingkerswell, M. Ingram of Leeds (pew! one short name), J. C. Gilcrest of Carshalton, M. Stone of Jerusalem, Mark Heaps of Washingborough, Phil Sapiro of Woolton, Liverpool, Olav Nielsen of Rulkedalen, Denmark, C. Jolly of Grove Park, London, D. Dickenson of



Rowley Park, Stafford, F. J. Taylor of Acklam, Middlesbrough, Justin Hewitt of Hixton, Staffs, Lionel Depeux of Asnières, France, A. A. Sissiqui of Chiswick, and Rachel Edmunds of Sedgfield, Co Durham.

All agreed that the number of volunteers in the room was 52 (not counting the Competition Master, who could make a 53rd — but we didn't need to know that). Tie-breakers were heavy on the beans but our favourite read: "I want to visit Giantland . . . because I think I left my car keys there."

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