

## DRAGON UPDATE

Newsletter of the National Dragon User Group.

### Issue 6.

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Happy half birthday to us! As a token of our demi-anniversary we now have a name, our thanks to Ken Grade. So let's take stock of the last six months and how they have affected us. The club is now established, and even has a little money in the coffers, existence is not quite the hand to mouth affair it was six months ago. There has been some 'slippage' in the issue dates, hopefully this edition will have clawed part of it back, again I have to thank Ken who has agreed to take over the distribution. The newsletter is rather thicker than it was and there have been some excellent articles, however I would have liked to hear more from those with advanced systems - a piece on the RS232 port by someone other than Status Quo would be welcome, and has anyone succeeded in porting the p-system on, Oasis claim that their Petite Pascal uses a p-code interpreter.

One of the most encouraging things to happen in the last six months has been the 6809 show, there is to be another one on the weekend of 22nd of March, as yet we don't know whether the group will be there, but obviously I hope so.

I hope that the next six months will be as successful as the last, but remember, by and large it depends on you - so if you want to keep hearing from us then we'd better be hearing from you.

### 64K UPGRADE by D. De Wilde.

This is the next installment from the Dragon Upgrade Manual that we had passed onto us by the Dutch User Group. It is a rather more complicated modification than that written for us by Bob Hall but has the advantage that it will work on any 32.

Again I must stress that you should only try this if you are technically competent, these articles have been translated from Dutch and the photocopies I got for the translation were pretty ropey, so there could be errors. I hope that anyone who tries this out and gets it to work will be good enough to write us an in-depth feature on the method that would be more appropriate to people who think that a soldering iron is a thing used for pressing uniforms.

In order to upgrade the computer to 64k you need 8 RAM chips, (4164 /150 nS) and 8 ic feet (wire wrapping) or ic pins which come loosley wrapped.

#### method.

- Open the computer.
- Remove all IC's on feet.
- Remove power connector.
- Remove cartridge protection.
- Remove keyboard.
- Remove all screws so that mother board can be taken out.
- Use a very fine pair of pliers to cut away rams IC1 to IC8.
- Clean the holes in the PCB.
- Put the IC feet in position, one by one, without inserting them completely. That way they can be resoldered from the top in case of faulty contacts.
- In order to avoid any unpleasant surprises you had better test every through connection for each socket.

When all IC feet have been soldered you had better test all pins from foot to foot.  
 Replace the motherboard in its position in the box.  
 Connect the power.  
 Switch on and test for 5V at PIN 1 of one of the RAMS.  
 Check whether the blue strap connects only the two bottom contacts.  
 Switch off.  
 Replace all 8 IC's.  
 Replace the 8 RAMS.  
 Screw everything tight.

That's the lot, it still only puts 32k at our disposal, but we can now -via software- use the full 64k, as well as OS-9 and FLEX.

Quite what the software referred to is I don't know, but I hope that Bob Halls routines published with his earlier conversion, and the piece in this edition will do the job. As I say if anyone tries it let me know how you get on.

cassette recorder mod. f.j.fisher.

The following modification was carried out on a Tandy TR12 recorder, but ought to be practical on almost any type.

Open the recorder, and disconnect the motor wire from X.

Solder one end of a piece of wire to X using a standard 2.5mm chassis socket (switched type).

Solder the free end of the motor wire to 2.

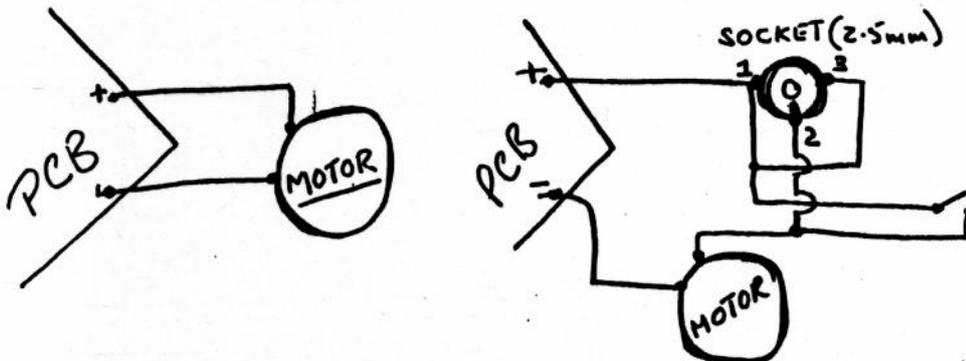
Solder free end of wire to 1 and 3 ( THIS IS IMPORTANT).

As a further mod:

Using a sub min. on/off switch wire it across 1 and 2. Using the switch will mean that you no longer have to remove the remote plug or type "motor on/off" when using FF or Rewind.

The socket and switch can be obtained from any Tandy or other electrical store, and the first mod greatly improves file handling as only the motor is switched, not the amplification circuit.

F.J.Fisher.



## DRAGON 55 (NEMESIS)

"DRAGON 55" gets its name from the facility to store up to 55 pages (i.e. not quite one Dragon text screenful) of text, notes and other miscellaneous information which can then be dumped to tape. By making the maximum amount of RAM available (one Pokes 25,6 before loading the program) for data storage, you can cram 55 pages of 28 lines into one file. Please note-it does not pretend to be a database. There are no fields to set up-you merely type merrily away until you run out of pages. I was quite intrigued by the idea-but not sure how to make use of it-and quite impressed by the lack of superfluous packaging and documentation which has plagued similar programs (in fact programs in general!).

For once, the program came on a very high quality cassette (other firms please copy!), with ALL instructions/information on a "Dragon 55" file following the program. The program is written in Basic incorporating (a) machine code routine(s). The facilities are as follows:-

- 1) A special "graphics mode" in which the numeric keys will print the block graphics characters;
- 2) The screen colour can be changed for any page by pressing a key then a number;
- 3) Cursor position controlled by the arrow keys;
- 4) Auto-repeat-but of course!-on all characters, including the graphics;
- 5) A "search and find" routine-to find where you wrote that dirty joke that's too good to lose!
- 6) Store and retrieve files from tape.

I cannot fault the program in operation. It does everything it is supposed to do very efficiently. The "Search" routine, for example will find the word/phrase you want, and tell you on which line of which page-and politely call that page up. If the word cannot be found, then the nearest approximation will be retrieved. (I wish the much acclaimed word processors could do half as well!)

As to what use this program could be put, I am not really sure. The main drawback is that there is no output to printer, so that discounts half of its usefulness. I am surprised one hasn't been included-it needn't have taken more than five lines (or one, for a complete screen dump of each page)-and it would have had much more appeal (to me, at any rate).

I am not quite certain to what use one could put the "graphics mode", either. If you want to experiment with combinations of block graphics, then it saves you typing "PRINT CHR\$(XXX)" every time I suppose, but there's no great gain in that.

As a store for programming routines, Peeks, Pokes (there are quite a few included in the demo file, as well as some useful Dragon addresses), and any other "notes" (the sort that usually get scribbled on bits of paper), it is quite handy. At the price of 5 pounds (less one pound for D.U.G. members!), it is very reasonable-if you have a use for it!

Ken Grade.

In the december issue i mentioned that Microdeal were going to bring out a program called 'Speed Racer' which was supposed to be a Grand Prix simulation. Well it has duly arrived and after extensive playing i'm not sure whether it was worth the wait!

A Grand Prix simulation it certainly isn't, as the object of the game is to pass a certain number of cars each lap. If you don't then that is the end of the game! If you do then onto the next lap you go. This time the cars are going a bit quicker but the number of cars to be passed always remains the same. If you complete 5 laps then you are the winner. And that is about it!

There are four different tracks to choose from, number 1 being a simple rectangle and number 4 containing lots of hairpin bends. By common consent number 3 seems to be the hardest as there is no place where you can really put your foot down. Number 2 is the one i prefer as it contains both straights and tight corners.

The graphic display is as expected in that you are looking from above and behind your car i.e. a 3D view. The actual speed and quality of the graphics are dissapointing. The road scroll is very jerky and for some unknown reason Microdeal decided to put a white line down the middle of the road. Along the bottom of the screen is a Speedometer, mile counter and a bar showing how many cars you have passed. You control your car with only the right joystick. Forward to increase speed, back to break. Pushing the joystick left or right moves the track the appropriate way.

Where the program really lets itself down is in the reality of the game. Breaking is a gradual affair and that means you can easily run into the back of another car. Also you cannot run off the track although if you stay on the shoulder for too long the car stops to get a tyre change. How on earth anyone manages to go round hairpin bends at 170 mph is amazing but thats what the program allows! The worst aspect of the program is having to pass a number of cars each lap. If you pass more cars than needed, the extra amount does not count for the next lap. Also it seems impossible to complete 5 laps as several times i have run out of cars to pass on the last lap.

Having said all that this game is streets ahead of any other on the market. If it had been for the, say Spectrum, nobody would buy it but for Dragon owners this is the best available. So, if you intend to buy it don't expect too much. I'm sure somebody else could improve on this game.

I received a couple of queries this month. The first is from Jeffery (or Geoffrey) Wilkes. He wants to know how to get to the Water room in Franklin's Tomb. The room is situated in the middle of nine rooms which have a common theme. Work out the theme and then utter a password in one of the nine rooms. As for the theme, Think of Russell Grant!! Also Mr. W Norrington (sorry i haven't got your first name!) wants a recommended adventure for first timers. If you want a standard adventure then try Salamander's Franklins Tomb. For a very easy adventure you could try Microdeal's Mansion Adventure. Also of note are two graphic programs from Touchmaster. They are Sea Quest and Shenanigans but they might be hard to obtain. If you want a dungeons and Dragons style game then go for Ring of Darkness by Wintersoft.

Doctor ASCI at your service.

Geoff has encountered a few other problems in his meanderings around adventures: firstly he's trying to find the Wine Celler in Franklins Tomb, as I remember the key to this is going bat@ with the lift. In Mansion of Doom he wants to cross the pool of acid near the vampire -search me, if he will visit such places... Mountain climbing and water crossing are his problems in Ring of Darkness, again I'm afraid I don't know the answers to these problems. Geoff has suggested an adventure help column -this seems a good idea so you take these two problems to start with I'll gladly print any answers and new problems that you have, so let's be hearing from you.

## REDUNDANT INFORMATION DEPT.

The following will give the exec addresses for all Dragon commands.

```
1 PRINT#-2,CHR$(13)
2 PRINT#-2,"TOKEN";TAB(20)"BASIC";TAB(40)"EXEC ADDRESS":PRINT#-2,CHR$(13)
3 A=127:B=32818:C=33108:D=205
4 A=A+1:IF A>D THEN END ELSE PRINT#-2,A;TAB(20)" ";
5 B=B+1:IF PEEK(B)<128 THENPRINT#-2,CHR$(PEEK(B));:GOTO5 ELSEPRINT#-2,CHR$(PEEK(
B)-128);
6 E=PEEK(C)*256+PEEK(C+1):C=C+2:PRINT#-2,TAB(40)E:GOTO 4
```

Or try the following for text screen dumps to most printers.

```
1 CLEAR200,32000
2 FOR A=32001TO32007
3 READ B:POKE A,B
4 NEXT A
5 POKE 361,1:POKE 360,125:POKE 539,126
6 STOP
7 DATA 52,23,182,0,111,129,0,39,3,53,23,57,53,23,52,23,129,93,39,16,182,125,87,1
29,0,39,238,53,23,189,128,15,52,23,32,229,182,125,87,129,0,39,12,125
8 DATA 125,87,142,125,77,189,144,229,126,131,113,124,125,87,142,125,68,189,144,2
29,126,131,113,32,67,79,80,89,32,79,78,0,32,67,79,80,89,32,79,70,70,0,0
```

OR IF THAT'S TOO MUCH TO TYPE, TRY THIS ONE.

```
1 REM SCREEN DUMP
2 POKE&H168,&H80:POKE&H169,&H0F:POKE&H167,&H7E
3 REM THAT WAS EASY ENOUGH I THINK.
```

Queries recieved:

Chris Owen,109 Silverweed Road, Chatham, Kent.

"I recently bought Dragon Data's "Calixto Island" but without instructions, and can't get it to load on my 64..(IO ERROR)...Any suggestions?. Also I have Salamanders "Grid Runner" without instructions, can anyone help?".

Reply: I know that some of the Dragon Data programs need a series of POKES before they will run on a 64, but I can't find any reference to Calixto being one of these. Could be you've simply got a dud copy?. I've asked Neil to try to find you instructions for Grid Runner, but if anyone else can help, please do so.

David Bateman. Orchard House, Cleator Moor, Cumbria.

Would like to know if anyone can tell him where to obtain a copy of "EL DIABLERO", or if anyone could let him have a copy if he were to send them a tape and the postage. (Why not?..it was a DD Copyright, and they no longer exist. Paul.)

## COMPUTER PROGRAMMING IN BASIC FOR EVERYONE.

Two years ago when I first bought a Dragon I had never heard of Basic or touched a computer before. I came across this excellent (in my opinion) book, which I consider to be just the thing for anyone making their first attempts at programming.

The book is in four sections:-

[1] A very short section discussing types of computer and a simple explanation of what Basic is.

[2]&[3] These two sections introduce the reader to the use of the comma and semicolon. Twenty key words (GOTO,DATA,INPUT,RETURN,etc) Four functions (ABS,INT,RND,SQR). Examples of simple programming, self-test exercises and invitations throughout th

[4] Covers applications such as Data Analysis, Games, and Simulations.

Once the reader realises that the Dragon has an ENTER and not a RETURN key, uses NEW instead of SCR and that the use of the comma will produce two screen columns and not five, they will be on their way to learning the foundations of Basic in a very

In my humble opinion, it is an ideal First Book. Written by Dwyer and Kaufman, it is published by Radio Shack (Tandy Corp.), Cat. No.62-2015, measures 8"x11", contains 156 pages, and costs 2.49.

J.D.Bateman.

6 6

Following last months hardware screen inverter, here's a software implementation from Ashley Adamson of the Romsey Area Dragon User Group. Ashley and the group can be contacted at: St. Almo, Slab Lane, West Wellow, Romsey, Hants, SO5 0BY.

```
10 'SCREEN INVERTER (BASIC LOADER)
20 CLEAR200,32580
30 FOR I=1 TO 184:READA#:Z=VAL("&H"+A#):CS=CS+Z:POKE I+32580,Z:NEXT
40 DATA 8E,7F,63,BF,1,68,8E,7F,D
E,BF,1,6B,8E,7F,F6,BF,1,A1,86,7E
,B7,1,67,B7,1,6A,B7,1,A0,39,7D,0
,6F,27,1,39,32,62,34,16,8E,FF,C0
,A7,84,A7,2,A7,4,A7,6,A7,A,A7,C,
A7,E,A7,88,10,A7,9,86,5,B7,FF,22
,35,2,34,2,BE,0,88,81,8,26,8,86
50 DATA 20,A7,84,A7,82,20,1C,81,
D,26,4,8D,32,20,14,81,80,24,E,81
,20,25,C,81,60,24,4,84,BF,20,2,8
0,20,A7,80,BF,0,88,8C,5,FF,23,12
,8E,4,0,EC,88,20,ED,81,8C,5,E0,2
5,F6,BF,0,88,8D
60 DATA 2,35,96,86,20,A7,80,1F,1
0,C4,1F,26,F6,39,81,C,27,1,39,34
,12,86,20,8E,4,0,BF,0,88,A7,80,8
C,6,0,25,F9,35,92,27,1,39,32,62,
20,E6
70 IF CS<>17097 THEN PRINT"DATA
ERROR":SOUND 1,2:STOP
80 EXEC 32581:CLS
90 PRINT"SCREEN INVERTER"
100 PRINT@32,STRING$(15,188)
110 PRINT:PRINT"ORANGE TEXT IS A
LSD AVAILABLE"
120 PRINT"DO YOU REQUIRE THIS? Y
/N"
130 X#=INKEY#:IF X#=""THEN 130
140 IF X#="Y" THEN POKE 32644,13
150 PRINT:PRINT"THE BASIC LOADER
PROGRAM IS NO LONGER NEEDED. 1
87 BYTES ARE RESERVED AT RAMT
OP."
160 PRINT:PRINT"DELETE THE LOADE
R PROGRAM? Y/N"
170 Z#=INKEY#:IF Z#=""THEN 170
180 IF Z#="Y" THEN CLS:NEW
190 PRINT:PRINT"AWAITING INSTRU
CTION"
200 END
```

Whenever using a GET command with the inverter type:

POKE 416,57 first  
and POKE 416,126 afterwards

eg. 100 POKE416,57:GET(X,Y)-(W,Z),A:POKE416,126

## LETTER FROM THE CHAIRMAN

Well, we've survived for half a year, more by luck than judgement, so it looks as though we're doing better than the majority of the user groups.....especially former Dragon ones!!.

What we need now, apart from more members, more money, and an offer of free printing (!) is some definite news from Eurohard. They told us, and I believe them, that the Dragon would be back in UK, but since then there have been various delays and and rumours (both good and bad), and no one seems to know exactly how long we will have to wait for the Return of the Dragon. Come on Eurohard, wake up!!...there will never be a better time for a return than NOW. With Acorn having "suspended trading", the Spectrum out of production, Commodore trying to sell the unsellable C16, etc, the market just HAS to be wide open for a REAL computer.

At the moment I don't know whether or not we'll be seeing you at the 6809 Show....the organizers seem reluctant to let us have a free stand this time around, and there's no way I can justify forking out over a hundred pounds of your subscription money just so that we can put in an appearance there. You never know your luck, we might yet get a "freebie", but if not one or more of us will be covering the Show, and we'll let you know what's new.

As I said in the last Newsletter, we still need more material for publication.....from YOU!. Looking back through the Application Forms it seems that you have a lot of very different interests, so why not write to us about them? You don't have to be a professional writer.....(tho' that doesn't mean we don't want professional work too, Mike!!)...but we really DO want you to contribute something...that's what the Group is all about. OK?. One final thing....do any of you ex-Dungeon members know where I can contact Pete Woods (the former "Dungeon Master")?.if so, please ask him to give me a call.

That's all for this month. Good luck, and keep writing. Paul.G.

J.D.Bateman.  
Orchard House,  
Cleator Moor,  
Cumbria,  
CA25-5LN.  
6.2.85.

Dear Paul,

Last year I wrote to you about certain programs running on my 32 but not on my 64. I think I may have found the answer.

About 9 weeks ago, I typed in a perpetual-motion type program from "Input Magazine". It would not run, giving an FC ERROR. On checking the line I found that it contained a PCOPY command. After checking the listing several times, I gave up in disgust, muttering dark abuse about certain typesetters.

However, last week, I purchased a Graphics System Program from Salamander. This also gave rise to an FC ERROR. On listing the faulty line I discovered it too contained PCOPY commands. I began to put two and two together. I blew the dust off my 32 and tried the program. It worked perfectly. So it would appear that some 64's (mine at least) will not accept PCOPY commands in the same format that the 32 does.

I have not yet managed to get the magazine listing to run on the 64, but I changed the offending line in the Salamander program, as shown below, and it now works perfectly.

I changed PCOPY N+4 TO N+16 [into] PCOPY N+1 to N+4.

I hope that this may be of some assistance to others, although it still won't be any use for M/C programs like "Junior" etc.

6 8

## USING A TELEX MACHINE AS A PRINTER

As promised in issue three of the newsletter this is the sequel to the earlier articles describing the interfacing of a Dragon to an ex GPO teleprinter. For new readers, the previous articles described a method that involved rather complicated and expensive hardware in addition to the software.

The latest software (which is fully re-locatable) does all the conversion work except the final transition from 5 to 80 volts. When PRINT#-2, or LLIST is used the Dragon sends its output to the printer port but the format is now serial, the Ascii has become Baudot and the speed is 20m.secs per bit (50 baud).

Another feature of the software is a text screen dump which is activated by the down-arrow key in immediate mode or PRINT CHR\$(10) in a Basic programme. This is very useful when running programmes such as disassemblers which do not have a built-in hard copy option.

The only hardware needed now is an opto-darlington to protect the Dragon and trigger a high speed relay. The relay contacts switch +80 or -80 volts as required to the 'Receive' terminal of the teleprinter. Only 3 connections are used at the printer port..... a 5v supply for the relay, the 0v line and the strobe pin which is used for the data.

The system needs no major modifications to the standard telex terminal. It is only necessary to remove one diode and in practice this has usually been removed already by Telecoms so that the machine will no longer function as a telex unit.

The latest version of the software and hardware is being marketed by COMPUTIL of 22 Grove Park, Burbage, Hinckley, Leics. LE10 2BJ.

### SPECIAL OFFERS

This contains most of the special offers that are available to members, I hope that you will avail yourselves of them as they are great value.

### FLOPPY DISCS

These are top quality 5.25" discs supplied by SBS Data Services. Individual orders are accepted at the price below for a box of ten, but if we get enough orders together at any one time to order 5 boxes we get a further reduction of £1.00 per box.

SS/DD soft sector normal price	£22.00	reduced price	£14.50.
SS/DD hard sector	£22.00		£14.50.
DS/DD soft sector	£27.00		£15.50.
DS/DD hard sector	£27.00		£15.50.

All prices are PLUS 15% VAT. With a little cutting on the cover a Dragon can take DS/DD's - a great saving. All orders to Paul, cheques payable to the group.

### CASSETTE TAPES

C5 - 2.5 mins per side leaderless computer tapes are available for £1.25 for 5 from Taurus Electrical Services, 26/28 Nottingham Road, Loughborough, Leics. LE11 1EU.

### CABLE SOFTWARE

Cable are offering their range at twenty per cent discount - see their ad in Dragon User for what's on offer. Place your orders through the editor.

Double Value Dragon -how to get maximum use of your D64s memory, by Bob Hall.

As everyone knows, the Dragon 64 has 64k of RAM, 16k of BASIC in ROM, and room for another 16k (nearly) of goodies such as DragonDos in the cartridge port - that's 96k altogether!. Unfortunately, all the standard ways of using the system (except perhaps the Andtek 'Plus' add-on) require you to throw part of it away - in '32k' mode, you leave the other 32k of RAM idling in the background - in '64k' mode, using Flex or OS9, you lose the ROM routines, though you may gain a rather better version of BASIC (BASIC09).

What can be done to make better use of the Dragon's resources? For the '64 in 32k mode, there appear to be two possibilities: - Firstly, we could hide machine-code routines in the upper 32k (accessing them in Map Mode 1 with the interrupts off). We could also put a high-resolution graphics screen in 'high' memory, which is easy to implement, because the SAM chip ALWAYS gets information for the Video Display Generator from RAM, never ROM, and so will correctly display our graphics in high memory, whilst we continue in BASIC in 32k mode. (A useful combination of these two ideas is a high-res-text-generator & its screen- I've used the one in Flex to run with Editext; however, more of this, hopefully, another day.)

The second way to use all the memory efficiently in 32k mode, is to use the SAM's Page-switching capability and have two independent programs in memory at the same time: one of these programs lives as usual between 0 & 32k (Page 0); the second is stored between 32 & 64k (Page 1)- but when we 'flip the page' the SAM will automatically add 32k to all the memory addresses from the cpu, before it sends them to the RAM, so that we can then address 'Page 1' as if it were at 0 to 32k. (However, it doesn't automatically do the same for the VDG addresses - see below).

The BASIC program which follows loads the necessary machine-code to do page-switching: it's configured to work with DragonDos, and by default goes into the cassette buffer at &H200. To use it without a disk, change the instructions at line 140 (JMP \$D917) to read "140 DATA 39,12,12" (ie RTS,NOP,NOP), and allocate a specific address for BA when prompted in line 430. The machine-code comprises 3 sections: SWOPIT, which dumps the stack-pointer in "HOLE", switches pages, and reloads the SP from the corresponding location in the other page; VDG, which keeps the Video Display looking at the right text-screen; and MOVIT, which sets up Page 1 initially, by copying page 0 into it and then altering a few locations. After the BASIC has run, it can be deleted (but the machine-code must be kept intact) - if Reset is pressed, SWOPIT will not in general work correctly (a bit more code, pointed to by the Reset vector, is needed). After the Basic has run, typing 'EXEC' (or executing it in a BASIC statement) will take you from one field to the other, and pick up any program from where it was interrupted; (however, SWOPIT could be linked into the 'End-of-Line' hook at &H19A-&H19C - or even into FIRQ). The routine is believed to work correctly for all BASIC programs (and many m/c ones), which use the text-screen only. It will also generate graphics correctly, but in Page 1 will not display them unless the statement 'SCREEN a,b' is expanded to 'SCREEN a,b: POKE &HFFD3,0'.

That's it - it's all quite easy really - give it a try!.

Bob Hall.

6. 'BASIC'  
PROGRAM

```
10 'HOLE-STACK STORED HERE
20 DATA 0,0
30 'SWOPIT-SWITCHES PAGES
40 DATA 34,7F
50 DATA 1A,50
60 DATA 10,EF,8C,F6
70 DATA 32,8C,75
80 DATA B7,FF,D4
90 DATA 10,EE,8C,EC
100 DATA 35,FF
110 'VDG-CHANGE VDG PAGE
120 DATA 7D,00,6F
130 DATA 27,03
140 DATA 7E,D9,17
150 DATA BD,80,0C
160 DATA 32,62
170 DATA 34,16
180 DATA 8E,FF,C8
190 DATA A7,0A
200 DATA 7E,A9,41
210 'MOVIT-SETUP INITIAL CONFIG
220 DATA 34,7F
230 DATA 1A,50
240 DATA 8E,00,00
250 DATA 10,8E,80,00
260 DATA B7,FF,DF
270 DATA A6,80
280 DATA A7,A0
290 DATA 8C,7E,FF
300 DATA 2F,F7
310 DATA 86,D5
320 DATA A7,8C,C6
330 DATA 4A
340 DATA A7,8D,7F,C1
350 DATA 86,0A
360 DATA A7,8C,D6
370 DATA 4C
380 DATA A7,8D,7F,D1
390 DATA B7,FF,DE
400 DATA 35,FF
410 '
420 CLEAR 500
430 PRINT"swopit here":PRINT"GIVE ME A HOLE TO LIVE IN";:INPUT BA
440 IF BA<300 THEN BA=512
450 SWOPIT=BA+2:VDG=BA+22:MOVIT=BA+45
460 FOR I=BA TO BA+92
470 READ V$:V=VAL("&H"+V$)
480 POKE I,V
490 NEXT I
500 EXEC SWOPIT
510 X=VDG:Y=INT(X/256):Z=X-256*Y
520 POKE &H169,Z
530 POKE &H168,Y
540 POKE &H167,&H7E
550 EXEC MOVIT
560 EXEC SWOPIT
570 EXEC SWOPIT
```

9 Assembly Language

```
TTL PAGE SWOP ROUTINE PIC
STTL DUMP REGS,STACK, SWITCH PAGES & RELOAD

HOLE FDB 0 STACK STORED HERE

SWOPIT PSHS A,B,X,Y,U,DP,CC
ORCC £$50 IOF
STS HOLE,PCR
LEAS SWOPIT+$80,PCR IN CASE OF NMI?
LS1 STA $FFD4 FLIP PAGE
LDS HOLE,PCR
PULS PC,A,B,X,Y,U,DP,CC
STTL VDG RESET ON RAM O/P HOOK
VDG TST $6F FIND IF O/P TO SCREEN
BEQ LV2
JMP $D917 DRAGONDOS HOOK
LV2 JSR $800C PUT CHAR ON SCREEN
LEAS 2,S DROP OLD RETURN ADDRESS OFF STACK
PSHS X,B,A
LDX £$FFC8 SAM VDG BITS START
LV1 STA $A,X
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