EXCOM

FOR THE OPUS DISCOVERY
DISC SYSTEM

INDEX

FITTING

Firstly ensure that the Discovery is disconnected from the mains and the Spectrum, turn the unit upside down and remove the four screws along the two side edges. Remove also the screw on the back. Carefully slide the cover off taking care not to pull on the Joystick connector. Once removed refer to fig 1 and locate the ROM chip. Gently ease out your old ROM and insert the new one exactly the same way around making sure that all the pins are fully home and none are bent underneath. If you don't have a 6116 RAM chip fitted now would be a good time to fit one. It goes into the empty socket next to the ROM. Refer to fig 1. Slide the cover back on and replace the five screws you took out earlier. Reconnect your Spectrum and switch on, if the copyright message does not appear switch off immediately and check orientation of the ROM (& RAM).
Assuming all is well insert a disc into drive 1 preferably with files on and type CAT #1, you should be greeted with a more complete catalogue the conversion is now complete. Please read the command instructions carefully.

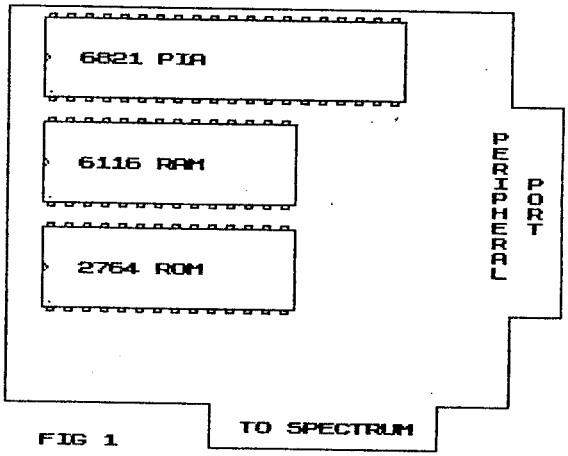

FIG 1

COMMANDS

Command	Syntax	Description
CAT	*d	Catalogue disc in drive 'd'. This shows hidden files, filetype, start address and length. When using this command within Beta Basic ensure that CSIZE 0 is set otherwise the catalogue will only be printed on the top line of the screen. This is caused by the routine poking values into the screen memory. NOTE This command does not support CAT *#n;d
ERASE	*<"m";>d;"filename"	Erases file called "filename" on disc in drive 'd'. This command supports a wildcard ("?") which, if placed in any position in the filename causes that character to be ignored. e.g. Suppose you had ten files called "Page 0", "Page 1", etc. you just type ERASE *d;"Page ?" and all the files will be erased.
FORMAT	*<"m";>d;"discname"	Rename the disc in drive 'd' with discname. NOTE This does not format the disc this must still be done with FORMAT d;"discname". NOTE The above three commands can be used from machine code in exactly the same way as the normal commands by using the CALUTL entry point but with the following options:- ERASE * LD H,#02 FORMAT * LD H,#08 CAT * LD H,#0A
LINE	nn	Edits line 'nn'. This avoids the sequence LIST 10 and then probably BREAK and then EDIT. Instead just type LINE 10. NOTE This command MUST NOT be used within Beta Basic as it causes Beta Basic to lose control. It should not be necessary to use this command however as Beta Basic has its own 'EDIT' command. NOTE v2.2 ONLY When in 128 mode this command places the cursor after the line requested and does not bring it down into the lower screen.
COPY	n	Copies screen to printer style depends on 'n' see below. n=0 Normal density dump. n=1 Double density dump. ** n=2 Simulated Colour. ** NOTE Option 2 will only work with an Epsom FX, LX, RX or TRUE compatible.

POKE	*nn,mm	Double poke. Pokes address 'nn' with low byte of 'mm' and address 'nn+1' with high byte of 'mm'. Will also do single pokes anywhere in RAM including the 2K optional RAM.
POKE	nn,"string"	Pokes string into memory starting at address 'nn'. This command will also operate on the 2K optional RAM.
CODE	*n<;s>	Dumps memory in hexadecimal and ASCII to screen or printer depending on 's'. If the parameter 's' is not defined then the command defaults to the screen. s=0 Screen s=1 Printer NOTE If using option 1 then the 't' channel must have previously been opened by OPEN#3;"t" NOTE In v2.2 40/80 this command has now been deleted to make room for the double step routines. If you require this command just send a disc and I will give you the command on disc, which can be used in conjunction with the ↑ command, by loading from disc and then typing ↑8336 as a direct command. The syntax is exactly the same.
CLEAR LINE	nn,mm	Block delete lines 'nn' to 'mm'. This command has only been added to v2.1 as it already exists in v2.2.
CLEAR DATA	x	Clear the variable 'x' from memory. This command has only been added to v2.1 as it already exists in v2.2.
LPRINT	*n<;n1><;n2>..etc	This command allows printer control codes to be sent without having to open the 'b' channel. (i.e. To set Pica Pitch LPRINT *27;77). You can string as many control codes as you wish into one statement. (e.g. LPRINT *15;27;68;65;0;27;120;1 sets condensed NLQ mode with horizontal tab set at column 65. NOTE If you open the 't' channel with a status of 8, (i.e. OPEN#3;"t";8) you can then use the Horizontal Tabs via the 't' channel. The list of values for status are:- 0 = LR/CR Sequence (Default value) 1 = ZX Printer emulation 2 = CR only 4 = True Backspacing 8 = CHR$ 9 Horizontal Tab

↑		Reset the System Variable Vector to its default value. **RANDOMIZE USR** 14070 has the same effect.
↑	nn	Set the System Variable Vector to point to the start of the new syntax checker.

NOTE 'nn' must be in the range:-
nn = 8336 or >= 24000
NOTE To use this command the optional 2K RAM MUST be fitted. This command will not work from within Beta Basic, due to the use of procedures not allowing you to start with a non alpha character and so the command is not recognised. Use either of the following:-

Type ↑nn before loading Beta Basic or if Beta Basic is already loaded

v2.1	v2.2
POKE *8312,nn	**POKE** *8334,nn

IMPORTANT
If the commands are in normal SPECTRUM RAM (i.e. >= 24000) and you reset the SPECTRUM or use **RANDOMIZE USR** 0 then you MUST type ↑ followed by <cr> to reset VECTOR to its default state before doing anything else as any errors will probably crash the computer. This is caused by the variable VECTOR being held in the 2K optional RAM which is not affected by these two operations.
This does not apply if the commands are stored in the optional RAM as this is only affected by switching off the disc drive or **RANDOMIZE USR** 14070 either of which will reset VECTOR to its default state.

Additional information 40/80 versions

Disc related commands will take approximately 35% longer when using a 40 track disc in an 80 track drive.
If your disc drive is fitted with a 40/80 switch then the switch must be left in the 80 track position.

Formatting

If you try to format with 80 tracks in a 40 track drive you will generate the error 'd Too many tracks'.

Reading & Writing

You can only copy discs using **MOVE** "d";1 TO "d";2 when both the discs are identical (i.e. Have the same number of tracks). This does not apply to MOVE 1;"filename" TO 2;"filename". In v2.1 drive number 4 has been implemented to allow copying of 80 track disc when you only have one 80 track drive installed as drive 2. Reading or writing to an 80 track disc in a 40 track drive will produce the error 'n Wrong disc'

SAVE, LOAD, VERIFY & MERGE

You can now omit the '*' in the above commands (i.e. **LOAD** 1;"Filename")

There now follows a listing for a new **DRAW** command to illustrate how to use the ↑ command.

```
        ORG     8336
START   CP      252             ;Is it 'DRAW' command
        JR      Z,DRAW          ;Jump if so
        ..      ..
        ..      ..
        OTHER COMMANDS          ;Check for other commands
        ..      ..
        ..      ..
        JP      ERROR           ;Command not found then must be error
DRAW    PAGE    #0018           ;Get character addressed by CHADD
        CP      #2A             ;Is it '*' (Note can be any character)
        JP      NZ,ERROR        ;No so must be error
        RST     #20             ;Point to next character
        PAGE    #1C7A           ;Get next two numbers
        CALL    STATEND         ;Check for end of statement
        PAGE    #1E94           ;Get y coordinate
        PUSH    AF              ;Save it
        PAGE    #1E94           ;Get x coordinate
        LD      DE,#0101        ;Set both signs to positive
        LD      HL,23677        ;HL:=Current PLOT position
        SUB     (HL)            ;Calculate x displacement
        JR      NC,DRAW1
        NEG                     ;Adjust displacement and sign
        LD      E,#FF           ;if negative
DRAW1   LD      C,A
        POP     AF              ;Fetch y coordinate
        INC     HL
        SUB     (HL)            ;Calculate y displacement
        JR      NC,DRAW2
        NEG                     ;Adjust displacement and sign
        LD      D,#FF           ;if negative
DRAW2   LD      B,A
        PAGE    #24BA           ;Draw the line
        RET
ERROR   LD      B,#04           ;CONTSIG offset
        JR      LOOKUP          ;Jump to lookup address of CONTSIG2
STATEND LD      B,#06           ;CHKEND offset
LOOKUP  RST     #30             ;Lookup
        DEFB    #12             ;Table #12
        JP      (HL)            ;Jump to routine
```

To call this command once it is in the 2K RAM type ↑8336 to set the variable VECTOR to point to start and then type **DRAW** *x,y. This command allows you to specify the point you wish to draw to, instead of having to calculate the length of the line as with **DRAW** x,y. You can not use the following commands in this way as they have already been used in the Disc Extended commands:-

CAT, FORMAT, ERASE, MOVE, OPEN#, LINE, POKE, CLEAR, CLS, POINT, COPY, LPRINT, ↑ and v2.1 only **CODE.**

There is also another method of extending basic commands, but this will **NOT** work in 128K mode or from within Beta Basic. The following routine is a modified version of a routine by ROB BANKS from the book published by HEWSON CONSULTANTS called Machine Code Extensions for Spectrum Basic.

```
        ORG     8336
START   CP      #2A             ;Check for '*', Can be any S/S character
        JP      NZ,ERROR        ;Not new command so signal error
        PAGE    #0018           ;Get next character
        OR      #20             ;Make it upper case
        SUB     #20
        LD      (HL),A
        SUB     #41             ;Reduce code to range 0 - 25
        JP      C,ERROR
        CP      #1A             ;Check it is in range
        JP      NC,ERROR
        ADD     A,A             ;Calculate offset
        LD      H,#00
        LD      L,A
        LD      DE,VECTAB       ;Locate required entry
        ADD     HL,DE           ;in vector table
        LD      E,(HL)
        INC     HL
        LD      D,(HL)
        EX      DE,HL
        JP      (HL)            ;Jump to relevant secondary parser
VECTAB  DEFW    ERROR
        DEFW    ERROR
        DEFW    ERROR
        DEFW    ERROR
        DEFW    ERROR
        DEFW    FCOM
        DEFW    ERROR
        DEFW    ERROR
        DEFW    ERROR
        DEFW    ERROR
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        DEFW    ERROR
FCOM    LD      HL,FRECOM       ;Point to model command
        CALL    CKCM1           ;Check if it matches subject command
```

```
        JP      NZ,FREE             ;Jump to relevant subroutine if so
        JP      ERROR               ;No more models must be an error
CKCM1   LD      B,(HL)              ;B:=Length of model command -1
        LD      DE,(#5C5D)          ;DE:=Start address of subject command
        PUSH    DE                  ;Save it in case it doesn't match
        PUSH    HL
        POP     IX
        INC     IX                  ;IX:=Start of model command
LLP1    INC     IX
        RST     #20                 ;Get next character
        OR      #20                 ;Make it upper case
        SUB     #20
        CP      (IX+#00)            ;Compare with model command
        JR      NZ,NOTCM            ;Jump if no match
        LD      (HL),A
        DJNZ    LLP1                ;Repeat for all characters
        POP     HL
        PAGE    #0074               ;Point to next character
        ADD     A,B                 ;Reset Zero flag
        RET
NOTCM   POP     HL                  ;Model command does not match
        LD      (#5C5D),HL          ;so reset CHADD to start of subject
        SUB     A                   ;Set Zero flag
        RET
CKCM2   CALL    CKCM1               ;Check command
        RET     Z                   ;Return immediately if no match
        RST     #20                 ;Get next character
        CP      #0D                 ;ENTER
        RET     Z                   ;Zero flag set if no parameters
        CP      #3A                 ;COLON
        RET
ERROR   LD      B,#04               ;CONTSIG2 offset
        JR      LOOKUP              ;Jump to lookup
STATEND LD      B,#06               ;CHKEND offset
LOOKUP  RST     #30                 ;Lookup
        DEFB    #12                 ;Table #12
        JP      (HL)                ;Jump to routine
FREE    CALL    STATEND             ;Check for end of Basic statement
        PAGE    #1F1A               ;BC:=Number of bytes used
        LD      HL,#0000            ;HL:=65536
        SBC     HL,BC               ;Calculate number of bytes free
        LD      B,H
        LD      C,L
        PAGE    #2D2B               ;Stack in floating point form
        LD      A,2
        PAGE    #1601               ;Select main screen
        PAGE    #2DE3               ;Print number on stack
        LD      HL,BYTFRE
        CALL    PRINT_HL            ;Print Bytes Free message
        RET
BYTFRE  DEFI    " BYTES FREE"
FRECOM  DEFB    #03                 ;Length of model -1
        DEFM    "FREE"              ;Model command
```

```
PRINT_HL LD      A,(HL)          ;Get character to print
         AND     #7F             ;Mask bit 7
         PAGE    16              ;Print character
         BIT     7,(HL)          ;More characters to go ?
         INC     HL              ;Point to next character
         JR      Z,PRINT_HL      ;If not last then print next character
         RET
```

To call this command once it is loaded into the 2K RAM first type ↑8336 to set the variable VECTOR to point to the start and then type *free. To switch off either method use ↑.

NOTE During the execution of all extended commands using either method the Discovery ROM is paged in.

NOTE V2.2
If you wish to place your Extended Basic Command routines in Paged Ram, you must write your own routine to Page in the relevant Ram Page during execution of these commands. Failure to do so will probably result in a crash.

```
ENABLE  PUSH    HL              ;Save address of character causing error
        PUSH    AF              ;Save the actual character
        CALL    PAGE_IN         ;Call your routine
        POP     AF              ;Restore the actual character
        POP     HL              ;Restore address of character causing error
        JP      START           ;Jump to extended command syntax checker
```

At the end of each command, instead of the RET instruction, you must jump to a routine to restore the original Ram Page. This routine MUST end with a RET instruction.

```
        JP      PAGE_OUT        ;Jump to your routine
```

Your own routines and the ENABLE routine above MUST be in fixed Ram. The best area is the 2K Ram in the Discovery.
Vector should point to the address of ENABLE.

There now follows two programs to load the two examples shown earlier.

Program 1 (DRAW*)

```
 10 LET c=0: FOR i=8336 TO 8400: READ a: POKE *i,a: LET c=c+a: NEXT i
 20 IF c<>7106 THEN PRINT "ERROR": STOP
 30 SAVE *1;"Draw"CODE 8336,65
100 DATA 254,252,40,2,24,50,215,24,0,254,42,194,200,32,231
110 DATA 215,122,28,205,204,32,215,148,30,245,215,148,30
120 DATA 17,1,1,33,125,92,150,48,4,237,68,30,255,79,241,35
130 DATA 150,48,4,237,68,22,255,71,215,186,36,201,6,4,24,2
140 DATA 6,6,247,18,233
```

To auto load from disc use the following:-

```
 10 LOAD *1;"Draw"CODE: ↑8336: NEW
```

Save with SAVE *1;"Loader"LINE 10

Program 2 (*FREE)

```
 10 LET c=0: FOR i=8336 TO 8552: READ a: POKE *i,a: LET c=c+a: NEXT i
 20 IF c<>20180 THEN PRINT "ERROR": STOP
 30 SAVE *1;"free" CODE 8336,217
100 DATA 254,42,194,37,33,215,24,0,246,32,214,32,119,214,65,218,37,33
110 DATA 254,26,210,37,33,135,38,0,111,17,180,32,25,94,35,86,235,233
120 DATA 37,33,37,33,37,33,37,33,37,33,232,32,37,33,37,33,37,33,37,33
130 DATA 37,33,37,33,37,33,37,33,37,33,37,33,37,33,37,33,37,33,37,33
140 DATA 37,33,37,33,37,33,37,33,37,33,37,33,33,100,33,205,244,32,194
150 DATA 58,33,195,37,33,70,237,91,93,92,213,229,221,225,221,35,221,35
160 DATA 231,246,32,214,32,221,190,0,32,9,119,16,241,225,215,116,0,128
170 DATA 201,225,34,93,92,151,201,205,244,32,200,231,254,13,200,254,58
180 DATA 201,6,4,24,2,6,6,247,18,233,126,230,127,215,16,0,203,126,35
190 DATA 40,245,201,205,41,33,215,26,31,33,0,0,237,66,68,77,215,43,45
200 DATA 62,2,215,1,22,215,227,45,33,89,33,205,46,33,201,32,66,89,84,69
210 DATA 83,32,70,82,69,197,3,70,82,69,69
```

To auto load from disc use the following:-

```
 10 LOAD *1;"free" CODE: †8336: NEW
```

Save with SAVE *1;"Loader" LINE 10

If you have any problems, suggestions for improvement or you want a personalised version with your own commands included, then please write enclosing a stamped addressed envelope to the following:-

P. Cheffings, 21, Carlton Park, Manby, Nr. Louth, Lincolnshire, LN11 8UQ.

Finally a big thank you to the following people without whom this program would not have been possible.

Ian Vaudrey at VSE for helpful advice, useful critisms and support. Brian Mumford for encouragement and support. Julie my wife for allowing me the time to write this program.

Program Problems

Dumpy (Bradway Software)

When ever you change your ROM you must use Dumpy (Original Disc) to recreate your print code.

Art Studio (Rainbird)

```
CLEAR 34999
LOAD #1;"studio_mc"CODE
POKE #40868,3891  v2.1
POKE #40868,4082  v2.2
SAVE #1;"studio_mc"CODE 35000,30320
```

Trans 1.08 (SDC Newsletter 21)

Modify line 9120 as follows:-

v2.1 & v2.2

```
9120 OPEN #3;"CODE " OUT :POINT #3;VAL "8304+(4 AND USR 8>2.1)": LPRINT "?
USR";: CLOSE #3: FORMAT 5;"RAMDISK 5"
```

Tasword all versions

If Tasword fails to operate correctly you must reload from your original disc and make any changes (i.e. customising or from the Newsletters) and then resave using option 'T' on the main menu.