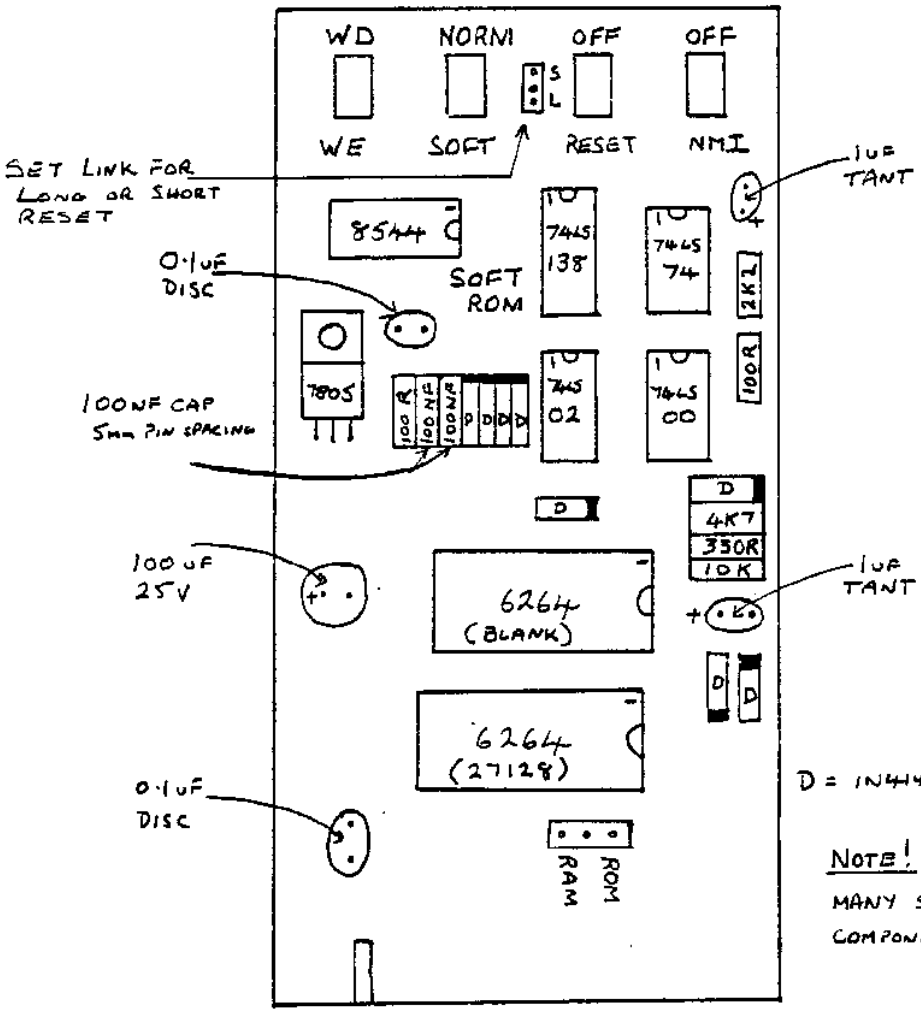
S P E C T R U M

S O F T R O M



PARTS LIST

QTY	COMPONENT		
2	6264	STATIC RAM 8K x 8	(RS 630-651)
1	8544	QUAD DE-BOUNCE ELIMINATOR IC	(RS 303-062)
1	74LS00	TTL	
1	74LS02	TTL	
1	74LS74	TTL	
1	74LS138	TTL	
1	7805	1A VOLTAGE REGULATOR	(RS 305-888)
2	1uF 35v	TANTALUM CAPACITOR	(RS 101-771)
2	100nF	CAPACITOR	(RS 114-840)
2	0.1uF	DISC CAPACITOR	(RS 124-178)
1	100uF 16v	ELECTROLITIC CAPACITOR	(RS 104-477)
8	1N4148	DIODE	
2	100R	1/4W RESISTOR	
1	2K2	" "	
1	4K7	" "	
1	10K	" "	
2	28 PIN	IC SOCKET (TURNED PIN PREFERED)	(RS 402-333)
4	SPDT SWITCH		(RS 317-336)
1	28 WAY	EDGE CONNECTOR (OPTIONAL)	

S P E C T R U M

[S O F T R O M]

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The SOFT-ROM is a 16K RAM board which uses the same memory space as the Spectrums internal ROM. Once loaded with the Sinclair operating system (or even your own!) the Spectrum's ROM is disabled leaving you with a 64K RAM computer.

The uses to which a SOFT-ROM can be put are only limited by the skill and ingenuity of the programmer. Some of them may include the following :-
Change the RESET code at 0 to give an ESCAPE Function
Use the non-maskable interupt (NMI) to stop programs.
Alter the SAVE/LOAD routines for other baud rates.
Addition of extra commands e.g. Hex notation.
etc. etc.

Switching between the Sinclair ROM and the SOFT-ROM RAM is by switch on the unit labelled NORM/SOFT.

To protect the software held in SOFT-ROM a WRITE DISABLE is included. This has been found necessary as parts Sinclair operating swstem overwrites itself!

Other Features included on the unit are RESET and NMI switches which have the following functions :-

RESET
On delivery this switch is set up to take the RESET line to the Z8O low for as long as the switch is in the RESET position. To avoid memory corruption (see notes an Dynamic RAMs) the small red link on the underside of the SOFT-ROM may be removed and the 1uF capacitor (C27) internal to the Spectrum also removed to allow a short pulse RESET of approximately 12 uS to be used.

NMI
This switch will not generate a non-maskable interrupt with the SOFT-ROM in the NORM mode as this would serve no useful purpose. When in SOFT mode, activation will cause an interrupt to be serviced.

Also, there is the facility to generate an NMI, at the instance of change over from NORM to SOFT, by switching to NMI while in NORM mode, when the switch over, is made there will be an automatic jump to 66h.

The SOFT-ROM will operate with Interface 1 but as it uses the ROMCS line to disable the internal Spectrum ROM, the SHADOW ROM is also disabled. Therefore, no Microdrive commands etc. can be used when in SOFT mode. Interface 1 will Function as normal when the SOFT-ROM is switched to NORM. There is a hardware fix to this problem requiring a small modification to Interface 1 (details available).

S P E C T R U M

[S O F T R O M]

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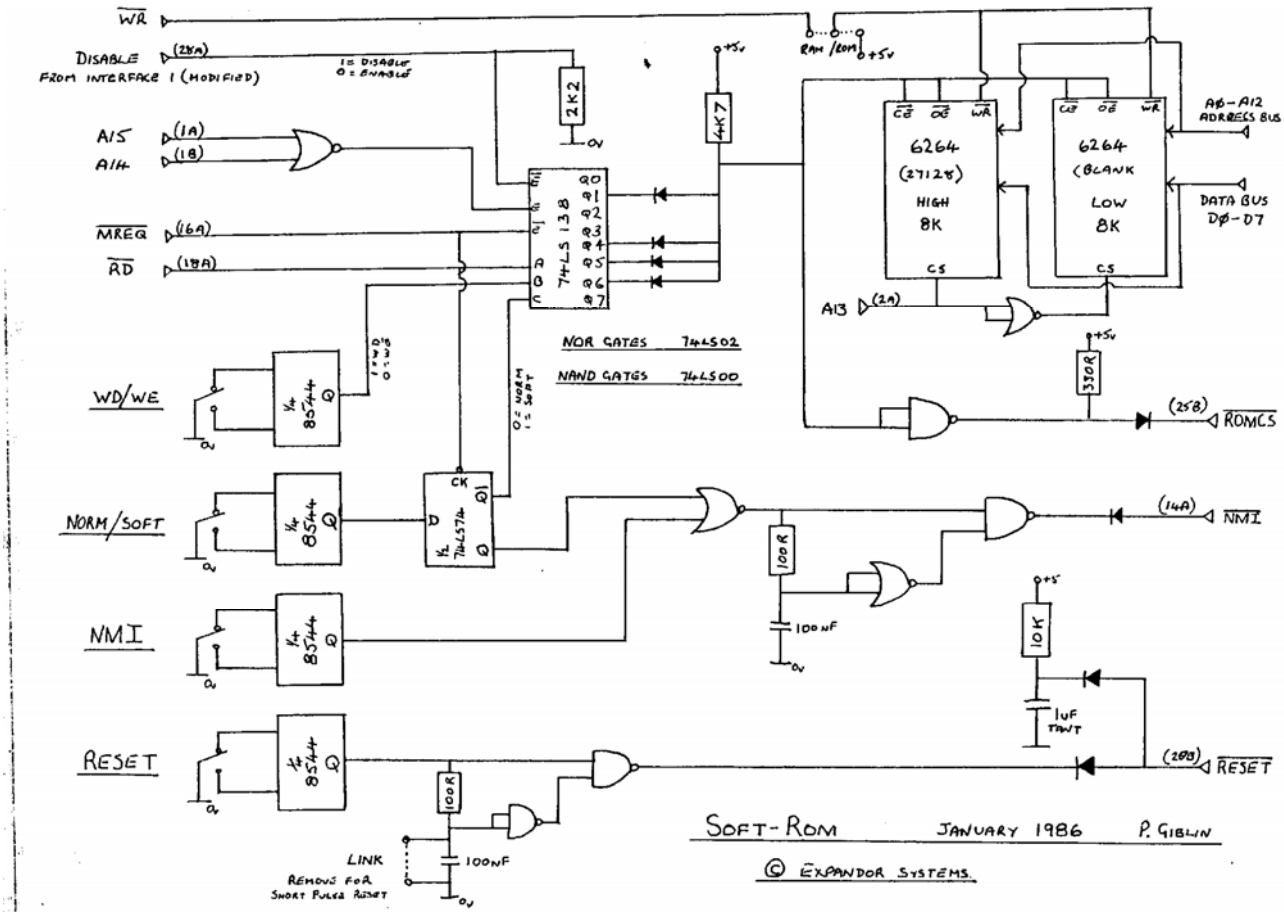

E X P A N D O R S Y S T E M S

S P E C T R U M

[S O F T R O M]

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USING THE SOFT-ROM

With each SOFT-ROM there is a tape containing a SOFT-ROM handling utility program. If you are a first time user of a SOFT-ROM please follow these instructions carefully.

Step 1. Switch off the power to the Spectrum.

2. Plug the SOFT-ROM into the Spectrums expansion port.

3. Put the Four switches on the SOFT-ROM to :-

   WD NORM OFF OFF

4. Re-connect the power to the Spectrum and verify that it is working as NORMal.

5. Load the supplied tape by LOAD "softrom". When the program has loaded you will be presented with the following menu :-

   1. Load SOFT-ROM code from TAPE
   2. Load SOFT-ROM code from MICRODRIVE
   3. Save SOFT-ROM code to TAPE
   4. Save SOFT-ROM code to MICRODRIUE
   5. Test the SOFT-ROMs RAM and copy the Sinclair ROM
   6. Save this program to TAPE
   7. Save this program to MICRODRIVE

6. Select option 5 and follow the screen instructions.

7. Return to the main menu.

8. Select option 2 and load in the block of CODE which follows the main program an the tape. This is 16K of CODE and is an example of an altered operating system. Its filename For loading is "ROM" (see ROM details).

The other options are straightforward and easy to use by following the screen prompts.

Interface 1 users may experience the occasional crash on switching from SOFT to NORM. This is probably caused by the paging system of Interface 1 getting confused. The answer to this problem is to modify Interface 1, or to execute a PAUSE 0 command then switch over and press BREAK.

PLEASE REMEMBER NEVER TO CONNECT OR REMOVE THE SOFT-ROM WITH THE POWER SWITCHED ON AS DAMAGE TO BOTH THE SPECTRUM AND THE SOFT-ROM INVARIABLY OCCURS.

S P E C T R U M

[S O F T R O M]

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ROM DETAILS
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The SOFT-ROM code supplied on the tape is an altered version of the Sinclair operating system and has the following changes incorporated :-

a) The Non-Maskable Interrupt (NMI) service routine at 0066h has been altered to give an ESCAPE function from a crash. The normal error routine is used so programs which change the ERR-SP system variable will cause problems.

b) The RESET code at location 0000h will perform a NEW rather than a total memory clear. BASIC programs will be lost.

c) Hexadecimal notation has been implemented (see separate sheet for listing).

d) The LOAD routine at 0556h will also print to the screen the starting address and the length of the code block after the program name.

e) The default colour attributes are black paper and white ink.

With the SOFT-ROM loaded with "ROM" and switched to SOFT, enter BEEP 10,10 and while the note is sounding activate NMI. This demonstrates the ability to break out of an otherwise uninterruptable loop.
Try using the Hexadecimal notation wherever a number can be used
e.g. SAVE "filename" CODE &B000,&E8A
RANDOMIZE USR &FCOO

Included on the tape (after, the "ROM" code) is a text file to be loaded into the Hisoft "GENS" assembler and has the filaname of "GENSFILE". This file has all the changes made to produce "ROM" listed.

DYNAMIC RAM MEMORIES AND RESET

On the Spectrum as supplied From Sinclair, the power on RESET is approximately 2OOmS long. This is far too long for the REFRESH of the 32K Dynamic memory to be maintained. Refresh will be suspended for as long as RESET is held low. Therefore if the CODE at location 0000h is to be changed to allow RESET to have other functions then a short pulse, less then 2mS must be used. By removing the luF capacitor (C27) INSIDE the Spectrum and removing the small red link under the SOFT-ROM this will be achieved. You will then be able to use RESET without corrupting memory.

S P E C T R U M

[S O F T R O M]

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INTERFACE 1 MODIFICATIONS

The SOFT-ROM is incompatible with Interface 1. The reason for this is that when the SOFT-ROM is paged in both the INTERNAL SPECTRUM ROM and the SHADOW ROM in Interface 1 are disabled and although the SOFT-ROM will still function, no Interface 1 functions will be available when in SOFT mode.

The answer to the problem is to use the ROMCS line from Interface 1 to temporarily page out the SOFT-ROM. This can be achieved by diverting ROMCS to the spare edge connector pad 28A, which is now a disable line on the SOFT-ROM.

THIS MODIFICATION MAY INHIBIT OTHER ROM BASED EQUIPMENT!

The modification steps are :-

(a) Cut out a small section of the PCB track to the edge pad 25B (underside at rear of Interface 1).

(b) Cut the leg of the edge connector to 25B into the Spectrum (be careful not to bend the 'A' row too far to reach the 'B' row).

(c) Make a wire connection from the 25B pad to the Spectrum side of the cut 25B leg and insulate.

(d) Make a wire connection from the bottom part of the 25B leg (solder point under PCB) to pad 28A an the top side rear of the PCB.

(e) For Interface 1 to work without the SOFT-ROM in place mount a DIODE (lN4148 only) to bridge the cut leg 25B.

(f) Check your work being especially careful to remove any solder splashes or bridges as it is very easy to damage both the Interface 1 and the Spectrum!

N.B. These notes are for your information and I (P.G.) will not be held responsible for any equipment failure caused by any person following these guide lines.

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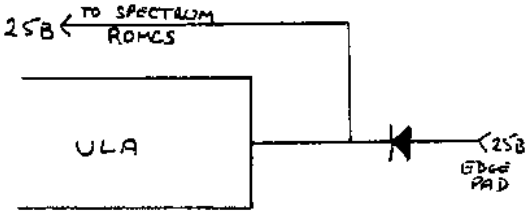
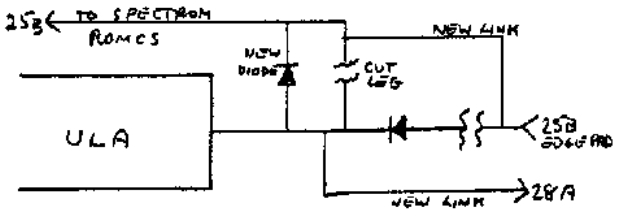
DIAGRAMS

STANDARD INTERFACE 1



MODIFIED INTERFACE 1



S P E C T R U M

[S O F T R O M]

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HEXADECIMAL NOTATION FOR THE SPECTRUM WITH SOFT-ROM

Format for use :-

The symbol '&' is placed before the hexadecimal number and the Spectrum will then accept it as a valid number in circumstance where a number is expected by the syntax check.

e.g. PRINT &FA + &A/200
SAVE "NAME" C0DE &EO1B,&A2C

```
 1      ENTRY          ORG   #3870
 2                CP    #C4         Test for BIN
 3                JR    NZ,NOTBIN   Jump if no
 4                JP    #2C9F       yes, do BIN
 5    NOTBIN           CP    #26         test for "&"
 6                JP    NZ,#2CB8    no, then do number
 7
 8                LD    DE,#0       Clear previous data
 9                LD    (#FFFE),DE  from spare location
10                LD    HL,#2CB3    Preset stack for
11                PUSH  HL          return
12
13    HEXCONV          RST   #20         Get next character
14                CALL  TEST        Go test for valid
15                RET   NC          HEX digit. NC = error
16                LD    HL,#FFFE    Now do HEX conversion
17                RLD               going round the loop
18                LD    E,(HL)            until a non-HEX digit
19                INC   HL          is found.
20                RLD               Exit with decimal
21                LD    D,(HL)            number in DE
22                JR    HEXCONV
23
24    TEST        CALL  #2D1B       Test for number
25                JR    NC,NUMBER   NC = number OK
26                CALL  #2C8D       Test for letter
27                RET   NC          NC = error
28                AND   #DF         convert to upper case
29                CP    #47         Test for 'G' upwards
30                RET   NC          NC = error
31                SUB   #7          Convert from ASCII to
32    NUMBER           SUB   #30         decimal
33                SCF               Return with carry set
34                RET               to flag OK.
35    ; ROM PATCHES
36                ORG   #2C9B
37                JP    #3870       Jump to HEX routine
38                ORG   #267B       Use 'POINT' routine
39                JR    #2C8D       to jump to number
40                ORG   #25AC
41                DEFB  #26         Change 'point' to '&'
```