The GOSH WONDERFUL ZX Spectrum ROM.

For use in emulators and hardware like “The Spectrum” and the Spectrum Next.

Filename: gw03.rom
Version: 1.40
Stardate: 20-JUL-2025

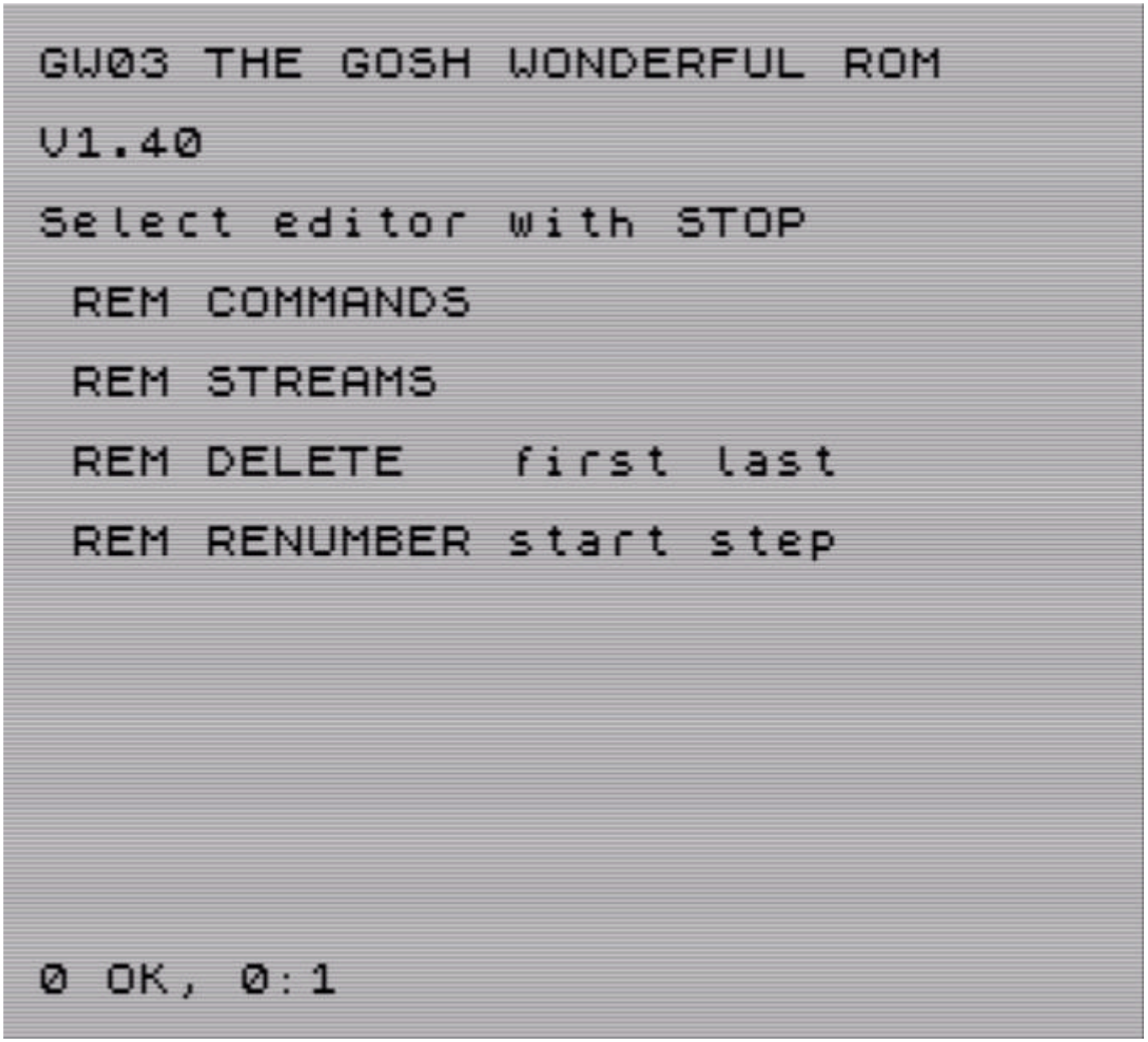
ROM formed by Geoff Wearmouth in November and December 2003 from an annotated file scsra.asm April 1998. (comp.sys.sinclair)

The gw03.rom is forward and backward compatible with the original 16K Spectrum ROM. It is therefore very straightforward to use. You already have a manual for it but if not one is available online, again thanks to Amstrad PLC.
The gw03.rom is more compatible with the BASIC manual than the original 1982 ROM.
In addition the BASIC now has a RENUMBER and BLOCK DELETE that were standard on BASIC implementations of the 1970s and 1980s and it is much easier to keep track of FREE memory and channels.
The ROM is fully compatible with the ZX Printer and also ZX Net and Interface 1.

The GW03 ROM

Tokenizer
The most obvious difference is in the editor as keywords have to be typed in letter-by-letter. You may wish to revert to the original editor and you can toggle between the two modes by entering 'STOP' or ‘stop’ at the command line. The method of typing words in full is preferred especially if you work with different languages.

Extended Commands
Apart from **'STOP'**, the other keyword that would have no meaning when entered directly is **'REM'** and this has been used to add additional direct commands. Entering 'REM' at the command line shows the commands and the version number of the ROM. Each command must be preceded by 'rem' entered in either upper or lower case.



REM streams
This is inspired by 'Stream Lister' which appeared in a microdrive book by Andrew Pennell and while this is just a cut-down version, it helps keep track of which streams are in use. An estimate of free memory appears at the top of the display and this is useful when developing programs. It is adjusted to give the same result as
PRINT 65536-USR 7962
which still works and gives the result 41473 on a standard empty Spectrum. With Interface 1 attached, and the extra system variables created, the result is 41415. It is especially useful when used with Interface 1 and the M.G.T. Interfaces, and free memory will fall as extra channels are used and rise when they are closed.

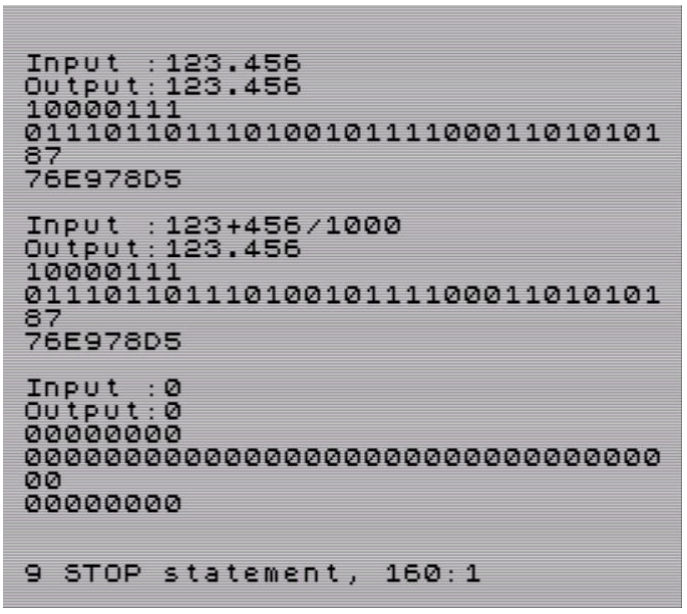
REM delete {first} {last}
The Block Delete is simple and will delete all BASIC lines between the first and last line supplied. The BASIC lines supplied must both exist in the program and be in low-high order. Only spaces are allowed as separators. The STREAMS command will show how much memory has been reclaimed.

REM renumber {start} {step}
This is a simple renumber like the one in Spectrum 128K BASIC with two parameters.

NON MASKABLE INTERRUPT
The NMI routine now simply performs a warm restart if your emulator or hardware is able to activate the NMI. It does not use the System Variable NMIADD which was used for other purposes by Sinclair Research.

THE NEW MATH !!
A combination of three routines written by Steven Vickers in the early 1980s results in optimum accuracy on your ZX Spectrum.
These are

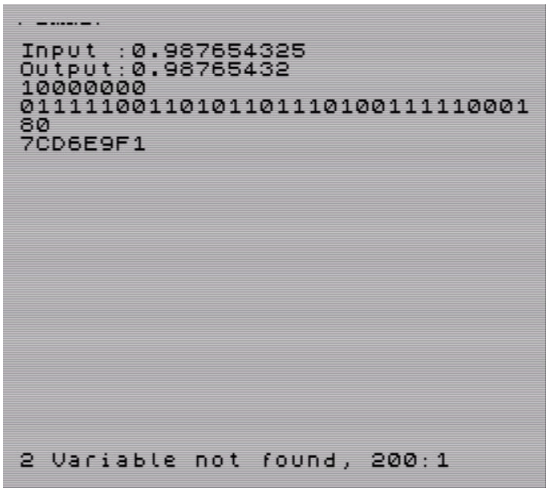
The correct parsing of decimal fractions
The original Spectrum built up decimal fractions by multiplying digits by 1/10, 1/100, 1/100 etc. - numbers that the Spectrum can't hold accurately and so a number like 123.456 gave the wrong result.
The integer 123 was correctly handled by a respectable ROM routine INT-TO-FP but the 456 was chopped up as described above and the patchwork result is higher than the correct answer.
My solution was to treat 456 as an integer and to do this simply by calling INT-TO-FP **again**. This places two integers on the calculator stack. We need a third integer so I wrote a short routine called DIVISOR to calculate the divisor which in the above example would be 1000. The calculator then executes a 'div' to calculate 456/1000 and then an 'add' to add to the integer 123 on the stack.
So PRINT 123+456/1000 will always give the same result as PRINT 123.456



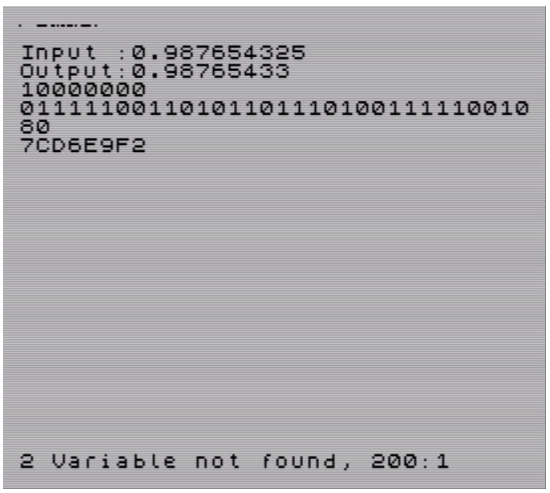
The original ZX Spectrum displays a mantissa **76E978D6** - one bit out.

2 **The collecting of the 34th bit during division** in the **first** correct setting.
The above routine solved almost all the problems associated with decimal fractions but one example number caused problems.
This is .987654325 which can also be expressed as 987654325/1000000000.
It should round up using the ninth digit as both components are less than the maximum accurate whole number possible - 4294967295 see ZX manual Chapter 7.
So I collected the 34th bit as suggested by Logan/O'Hara and it worked.
On the Timex TC2048 and "The Spectrum" default BASIC it just causes problems.
It can only be turned on in a perfect number system.
Note the Spectrum displays numbers 50 eight significant places.

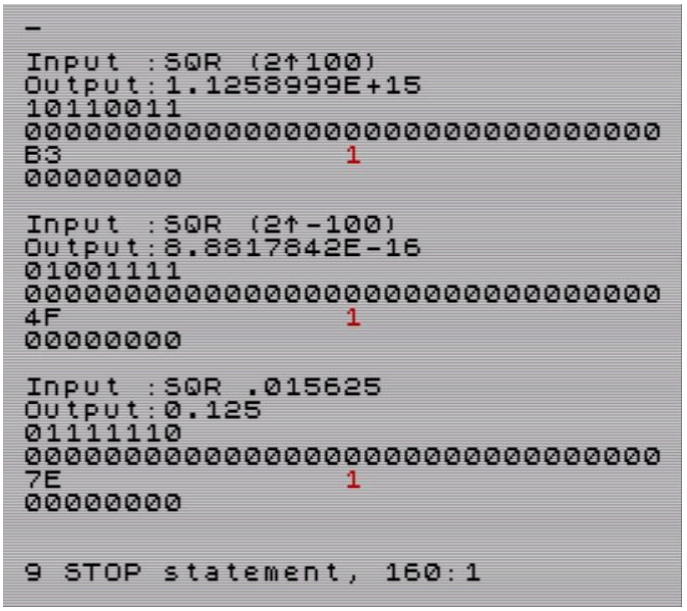
Without 34th bit



with 34th bit



3 **The third Vickers routine is to use The Newton-Raphson method** to determine square roots. Both Vickers and his sister outlined the method in their respective manuals for the Jupiter Ace. There was no room in the ZX81 or else it might have been considered. My square root routine from the sg81.rom had faults in the manipulation of the exponent for the initial guess and the routine now gets all the roots of powers of two in one iteration. The idea was to use the exponent to get the first guess in the right ballpark. The number of iterations is recorded and usually takes no more than 5 or 6 iterations. The following are correct with the first guess.



Other Features

The development has always been short of room. Some well known imperfections have been considered to give a more satisfying response and a full list follows.

Source: Understanding Your Spectrum by Dr. Ian Logan, 1982. (12 bugs listed in appendix)

1) The 'division' error has been fixed as detailed above. All reciprocals of power of two are now perfect.

The Spectrum does not have many imperfections but since the tweaks are common to both of my ROMs they are covered in full in a technical file that covers the GW03 and LG18 ROMs. Some of these tweaks are my own and others have appeared in books and magazines over the years.