LC3 Hardware Specification

CPU

Z80A running at 3.5 Mhz.

IRQ is called at frame sync rate (50Hz), meant to be used in IM1.

Memory

ROM "Cartridge" of up to 32k from $0000-$7FFF.

Do not assume partial decoding works.

The area from $1000-$13FF contains the ROM based user defined graphics (as well as the vectors), these are graphics numbers $00-$7F.

RAM Memory, 1k by default from $8000-$83FF.

This can be expanded as far as 64k.

Graphics

The screen is a 32 x 20 character screen (640 bytes). The graphic numbers are stored at $8000-$827F.

The attributes are stored in 32 x 24 Nibbles (e.g. 384 bytes), these are stored from $8280-$83FF. The low byte is the left hand pixel. The 4 bit attributes are the same as the Spectrum (e.g. half bright).   .

RAM UDGs are stored from $8000-$83FF and are graphics numbers $80-$FF. However only $82C0-$82FF is actually available for this (the rest is character or colour RAM) which is chaacters 216-223 ($D8-$DF). In practice it is pretty desperate for RAM memory :)

Extra RAM can be extracted by setting all the attributes for a line to the same as the background ; that character code space is then available for use.

Alternative behaviour with more RAM

The 'extension' flag does the following :-

1) Moves the attribute RAM to $8680-87FF ; mapping is otherwise unchanged. This allows the full 32x24 character display to be shown (it is truncated normall) which occupies $8000-$82FF.

2) UDG RAM space is moved from $8000-$83FF to $8400-$87FF

Mapping a Graphics Cell Address to an Attribute Address

This requires a little bit of tweaking, but it is not difficult.

Action	Cell start	Cell end
Start value	$8010	$8210
Make it an offset from start	$0010	$0210
Shift Right once (bytes → nibbles) – carry describs nible half	$0008	$0108
Xor address High with $83	$8308	$8208
Xor address Low with $80	$8388	$8288

The range for attributes maps $000-$280 (screen) onto $280-$3FF. (attrobute)

Other Devices

Standard Sinclair Joystick (port $FE)

Beeper (port $FE)

Cassette I/O as per the Sinclair specification (port $FE)