


# Tynemouth Software

## TYNEMOUTH SOFTWARE MINSTREL ZX80 CLONE ISSUE 2 V2.9 PARTS LIST

### CAPACITORS – AXIAL CERAMIC RATED 16V OR HIGHER

- 4 x 47pF (*usually marked 47 or 470*)
- 1 x 10nF (*usually marked 10n or 103*)
- 2 x 47nF (*usually marked 47n or 473*)
- 11 x 100nF (*usually marked 100n or 104*)
- 1 x 1uF (*usually marked 1u or 105*)
- 1 x 22μF (*axial electrolytic rated 25V*)

### RESISTORS – ALL ¼W 5% OR BETTER (4 BAND RESISTOR COLOUR CODES SHOWN)

- 2 x 75Ω
  - 1 x 180Ω
  - 1 x 330Ω
  - 1 x 390Ω
  - 1 x 470Ω
  - 1 x 680Ω
  - 17 x 1KΩ
  - 2 x 2.2KΩ
  - 1 x 2.7KΩ
  - 1 x 4.7KΩ
  - 6 x 47KΩ
  - 1 x 220KΩ
  - 1 x 1MΩ
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### SEMICONDUCTORS (NEW TEXAS INSTRUMENTS 74LS CHIPS RECOMMENDED)

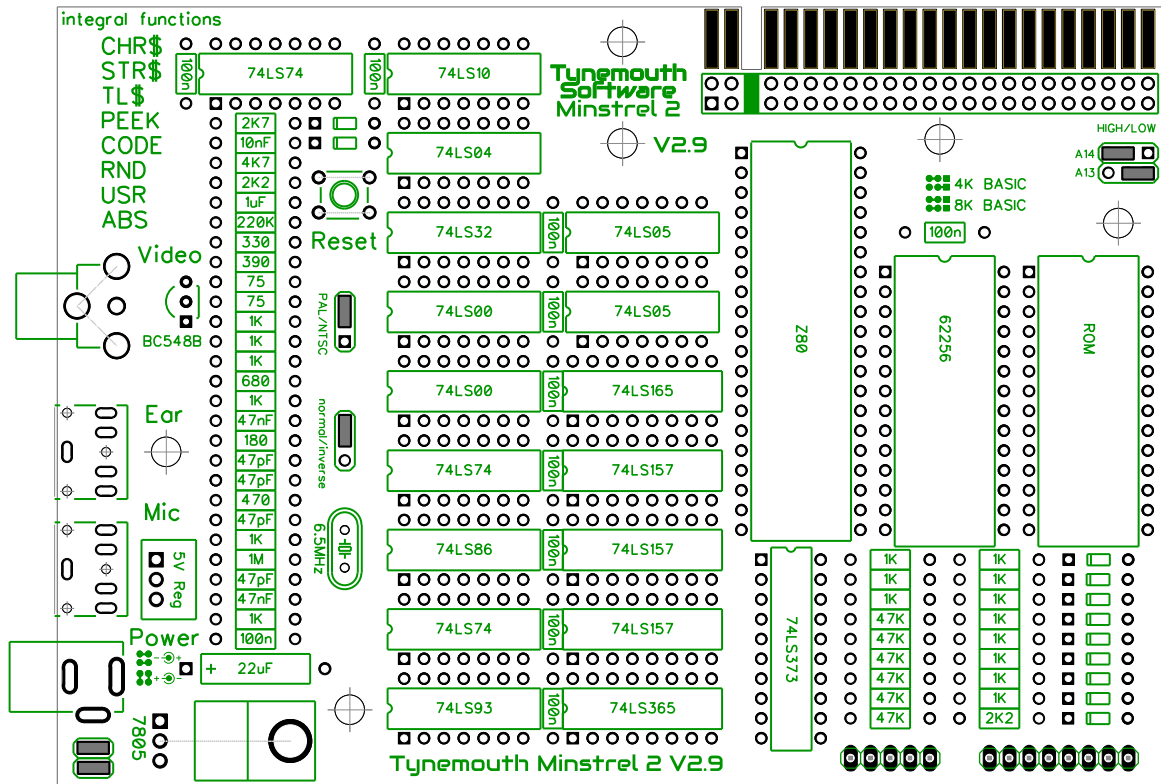
- 11 x 1N4148 diode
- 1 x BC548B or similar NPN transistor
- 2 x 74LS00
- 1 x 74LS04
- 2 x 74LS05
- 1 x 74LS10
- 1 x 74LS32
- 3 x 74LS74
- 1 x 74LS86
- 1 x 74LS93
- 3 x 74LS157
- 1 x 74LS165
- 1 x 74LS365
- 1 x 74LS373
- 1 x Z80 CPU Z84C0008PEG
- 1 x 7805 replacement switching replacement (part marked 7805 is not fitted)
- 1 x Programmed 27C256 EPROM
- 1 x 62256 32K SRAM
- 1 x 6.5 MHz Crystal

### CONNECTORS / SWITCHES

- 2 x Stereo 3.5mm Jack
- 1 x Phono jack
- 1 x 2.1 mm DC Jack
- 1 x miniature tactile switch 6x6mm (*for reset*)
- 40 x miniature tactile switch 6x6mm, 7mm high (*for keyboard*)
- 2 x 2 way and 4 x 3 way headers with jumper (*or fit wire links*)
- 2 x 28pin, 1 x 40pin IC sockets
- 12 x 14pin, 5 x 16pin, 1 x 20pin IC sockets (*optional, not included*)

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## COMPONENT PLACEMENT



## JUMPERS

Jumpers or link wires need to be fitted to the positions marked with black boxes above; these are shown in the default configuration of centre negative supply, normal PAL video, 4K BASIC ROM.

The jumpers near the power connector set the polarity of the power input

	Centre negative, used by optional TFW8b.com supply (also Spectrum and Commodore 16 computers)
	Centre positive, used by pretty much every other power supply

Power requirements are around 9V DC. Current consumption is around 200mA for the board alone, more if you plan to use the expansion port.

The NTSC jumper sets video standard

	PAL 50Hz video
	NTSC 60Hz video

The Inverse/Normal jumper selects video mode

	Normal = black text on a white background.
	Inverse = white text on a black background

ROM Address Jumpers

<b>A13</b>	Pin 26 High (5V) or Low (0V)
<b>A14</b>	Pin 27 High (5V) or Low (0V)

When using a ROM chip larger than 8K, the jumpers near the ROM chip select a ROM image. These should be set to the left, 'High' unless you have multiple images on your EPROM.

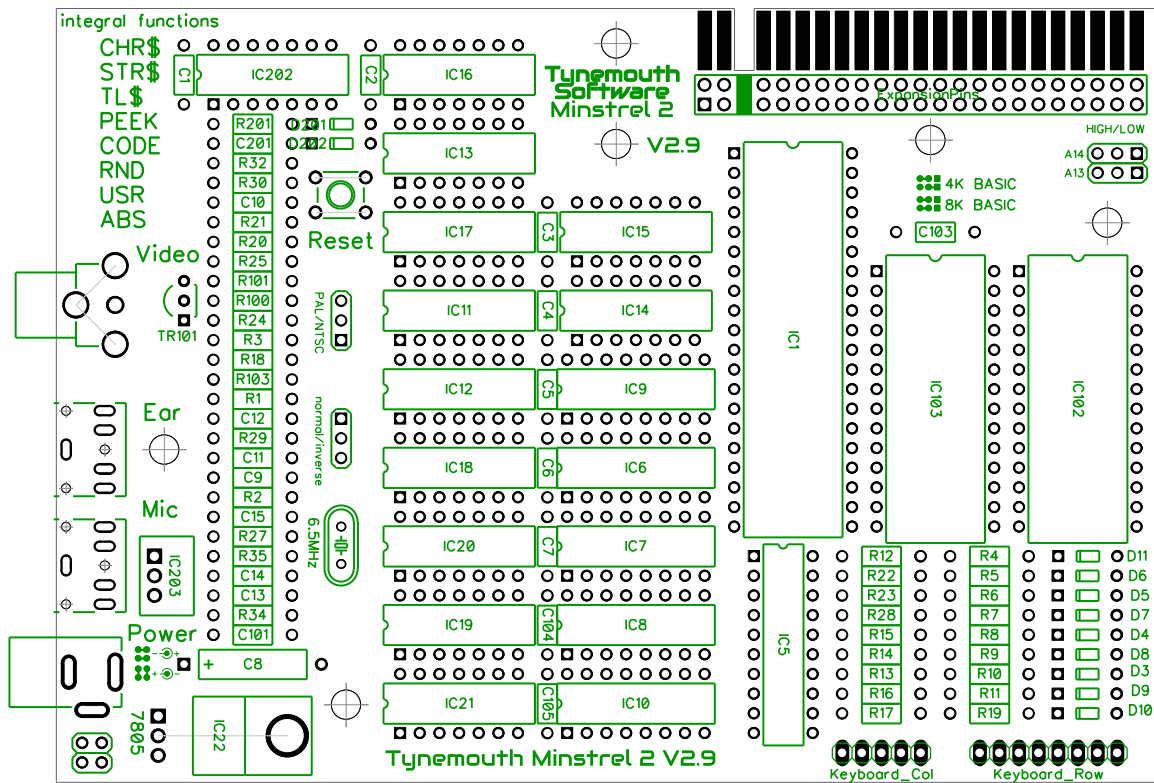
An example dual 4K/8K ROM could be set as follows:

<b>A14</b>	<b>A13</b>	<b>ROM selected</b>
HIGH	LOW	ZX80 4K BASIC
HIGH	HIGH	ZX80 8K BASIC

All 'high' will select the topmost 8K segment in the ROM chip. All low will select the first 8K of the ROM chip. The default is all high as some smaller ROM chips need the unused higher address lines tied high for normal use.

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## BOARD LAYOUT WITH PART NUMBERS

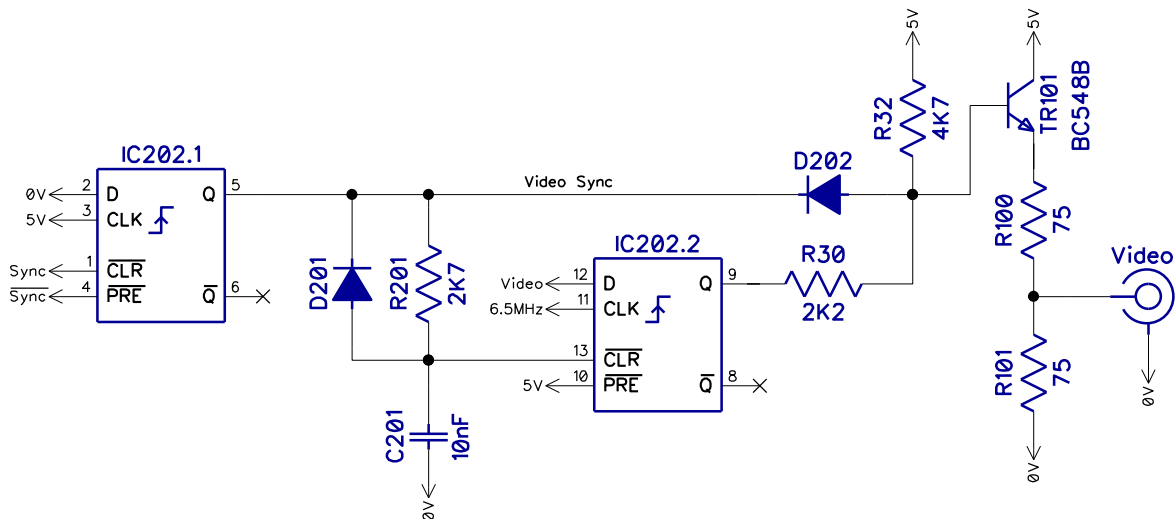


## ADDITIONAL PARTS OVER ZX80 SCHEMATIC

1xx part numbers are part substitutions for modern ROM and RAM chips to replace the original 2532 and 2114 chips which are no longer in production. R103 (680Ω) has inserted between IC6 pin 7 and the  $\overline{\text{ROM\_CS}}$  line. This is connected to pin 23B on the edge connector (which is unused on the ZX80) and allows the ROM to be disabled remotely (which matches the ZX81). R25 has been reduced from 470Ω to 390Ω for stability.

## MODIFICATIONS TO VIDEO OUTPUT CIRCUITRY

2xx part numbers are related to video improvements. The video sync signal is buffered and drives a modified composite video mixer and amplifier to improve signal levels. The buffered sync signal also drives a pulse stretching circuit to add the missing back porch to help black level on modern TV sets. Finally a pixel synchronisation stage reduces thin lines on the rightmost pixel of some inverted characters.



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## ZX80 SCHEMATIC

Redrawn by Grant Searle

