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   (R25 was 470Ω)
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

SEMICONDUCTORS (NEW TEXAS INSTRUMPENTS 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 / NEC D780 / Zilog Z84C0006PEG / Z84C0008PEG / Z84C0010PEG (4MHz or higher rated)
1 x 7805 + heatsink **OR** 7805 replacement switching replacement (do not fit both)
1 x 27C64 – 27C512 EPROM
1 x 62256 32K SRAM (e.g. Alliance AS6C62256 or Cyprus CY62256)
1 x 6.5 MHz Crystal

CONNECTORS / SWITCHES

1 x 5 way, 1 x 8 way 0.1" FFC connector (for ZX81 membrane) *(e.g. TE Connectivity 5-520315-5, 5-520315-8)*
2 x Stereo 3.5mm Jack *(e.g. CUI SJ1-3525N – Digi-Key SJ1-3525N)*
1 x Phono jack *(e.g. CUI RCJ-011 – Digi-Key CP-1400-ND)*
1 x 2.1 mm DC Jack
1 x miniature tactile switch 6x6mm *(e.g. Diptronics DTS-61N)*
2 x 2 way and 5 x 3 way headers with jumper *(optional or wire links)*
2 x 28pin, 1 x 40pin IC sockets *(turned pin recommended)*
12 x 14pin, 5 x 16pin, 1 x 20pin IC sockets *(optional, turned pin recommended)*

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COMPONENT PLACEMENT
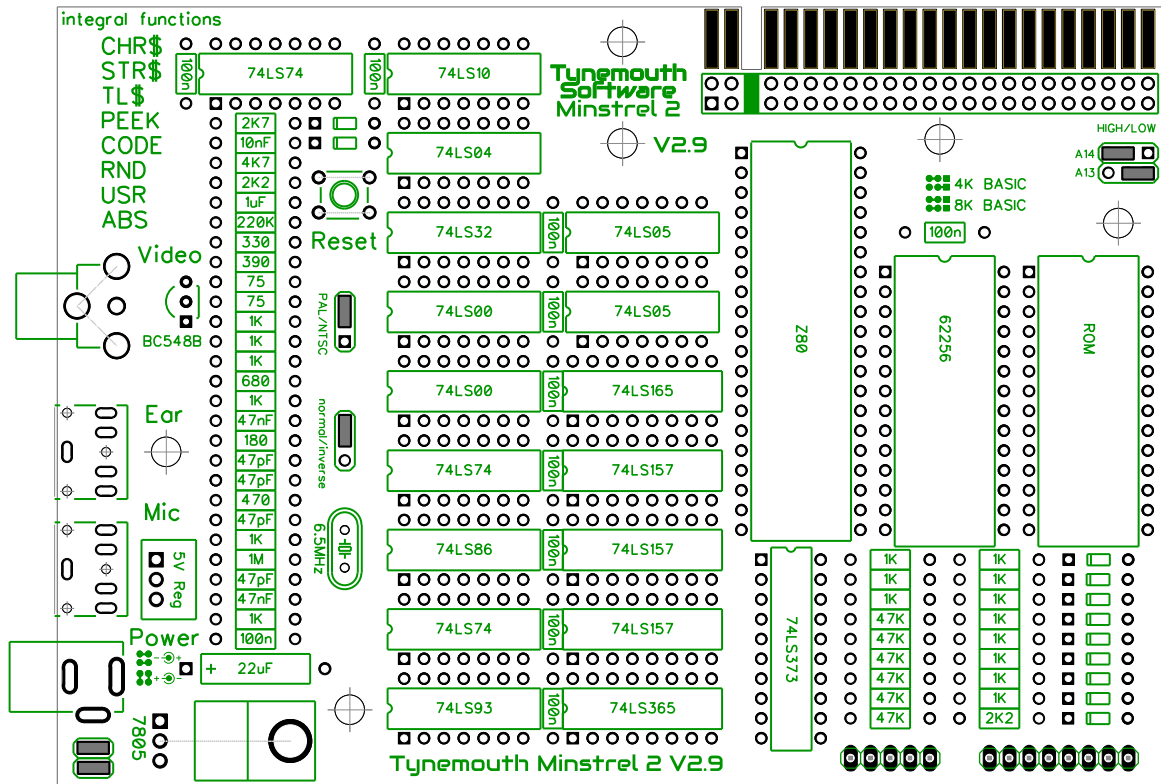
JUMPERS

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

A13	Pin 26 High (5V) or Low (0V)
A14	Pin 27 High (5V) or Low (0V)

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

A14	A13	ROM selected
HIGH	LOW	ZX80 4K BASIC
HIGH	HIGH	ZX80 8K BASIC

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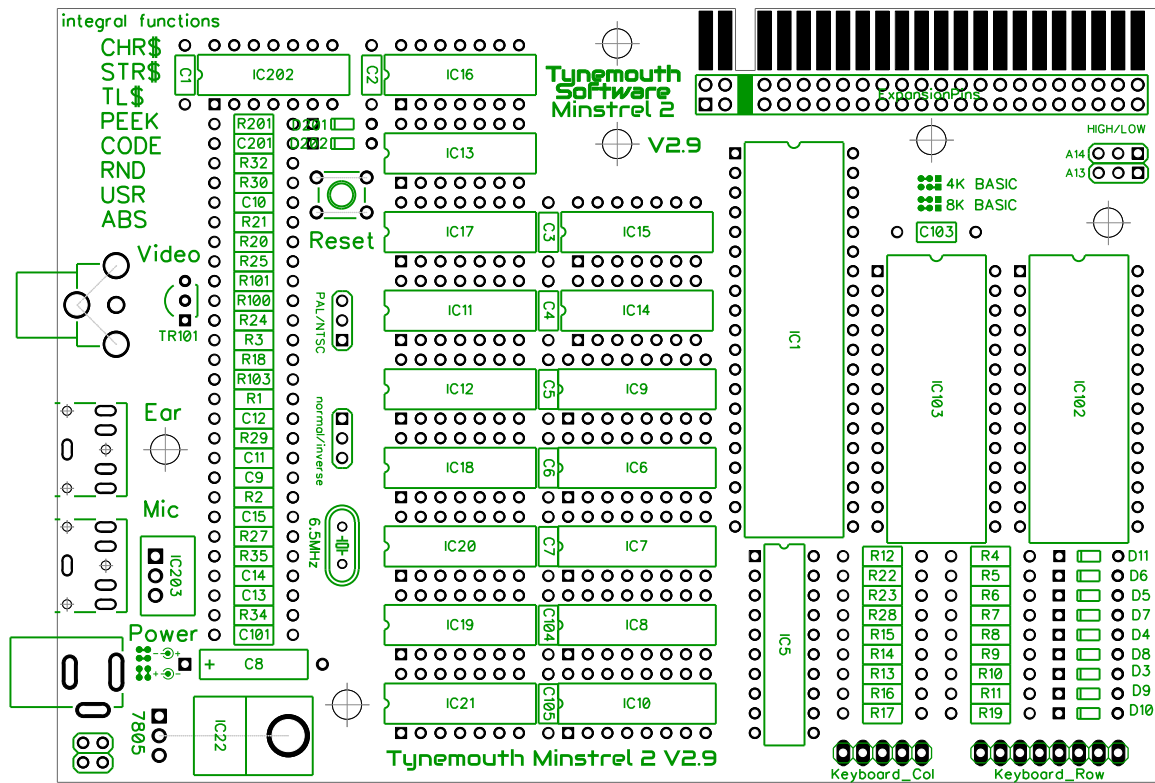
All 'high' will select the topmost 8K segment in the ROM chip. All low will select the first 8K of the ROM chip. The default is all high as some smaller ROM chips need the unused higher address lines tied high for normal use.

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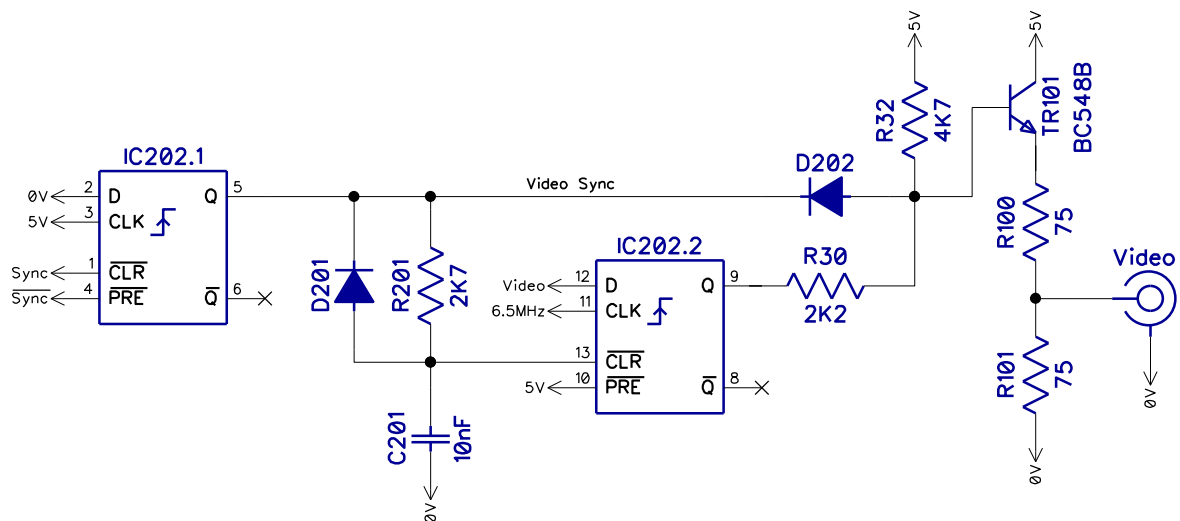
BOARD LAYOUT WITH PART NUMBERS

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).

MODIFICATIONS TO VIDEO OUTPUT CIRCUITRY

2xx part numbers are related to video improvements. The video sync signal is buffered and split to a pulse stretching circuit is used to add the missing back porch to help black level on modern TV sets, and to a modified composite video mixer and amplifier to improve signal levels. V2.9 PCBs also include a pixel synchronisation stage to reduce thin lines on the rightmost pixel of some inverted characters.

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ZX80 SCHEMATIC

Redrawn by Grant Searle

IC	TYPE NO	IC	TYPE NO
1	780 - 1	12	74LS00
2	8332	13	74LS04
3	2114	14	74LS05
4	2114 - 1	15	74LS05
5	74LS373	16	74LS10
6	74LS157	17	74LS32
7	74LS157	18	74LS74
8	74LS157	19	74LS74
9	74LS165	20	74LS86
10	74LS365	21	74LS93
11	74LS00	22	7805