Tynemouth Software

TYNEMOUTH POWERED MINSTREL EXPANSION BUS

OVERVIEW

This is a powered four slot expansion bus for the Minstrel 2, Minstrel 3, ZX81 or TS1000.

It provides 4 2x23 way pin header slots, as found on later Minstrel 2 and 3 main boards, and one through edge connector as found on all these machines.

The expansion slots are powered from their own 5V supply generated by a 7805 regulator from a 9V DC input barrel jack. This can optionally be shared with the host to allow a single 9V supply to be used (handy to power a ZX81 without having to use the 3.5mm power jack.

PARTS LIST

CAPACITORS – CERAMIC RATED 16V OR HIGHER

5 x 100nF axial *(usually marked 100n or 104)*
1 x100µF *(axial electrolytic rated 25V)*

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

1 x 1KΩ 

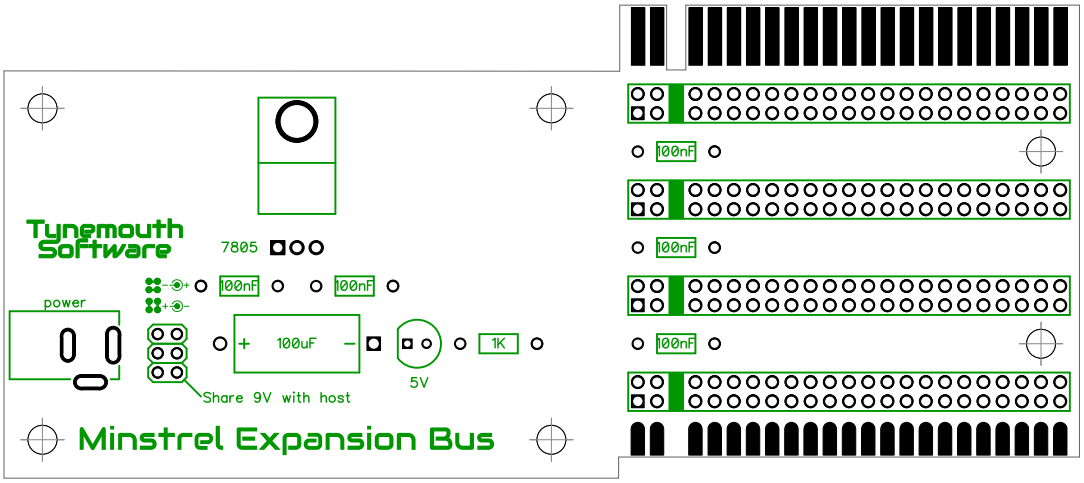
SEMICONDUCTORS

1 x 7805 or 7805 switching replacement
1 x 5mm LED, green or the colour of your choice

CONNECTORS / JUMPERS

1 x 2.1 mm DC Jack
3 x 2 way 0.1” jumper and caps or wire links
4 x bus connectors, 2x23 way or 2x2 and 2x20 0.1” vertical socket
2x23 pin 0.1” pin header or 2x23 way 0.1” edge connector (open ended)

COMPONENT PLACEMENT



Tynemouth Software

ASSEMBLY

Start with the lower height components, the resistor and capacitors, then the regulator (soldered, riveted or bolted if you like), finally the connectors and LED.

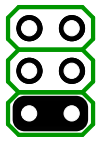
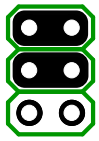
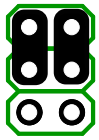
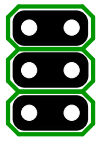
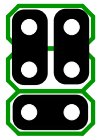
It is advisable to solder the host pin header or edge connector before the bus connectors; otherwise it can be difficult to reach the solder pads on the top side of the board.

JUMPERS

The top two jumpers set the polarity of the DC barrel jack, both horizontal is centre negative (i.e. ZX Spectrum, Commodore 16, Guitar Pedals etc.), both vertical is centre positive (everything else).

The bottom jumper is used to share the 9V with the host. If that is not fitted, the expansion bus will require its own 9V DC supply.

If it is fitted, the 9V is shared with the host, and power can be connected to either this jack, or the 9V DC in jack on the host. This can be useful for a ZX81 to provide a more reliable power connection.

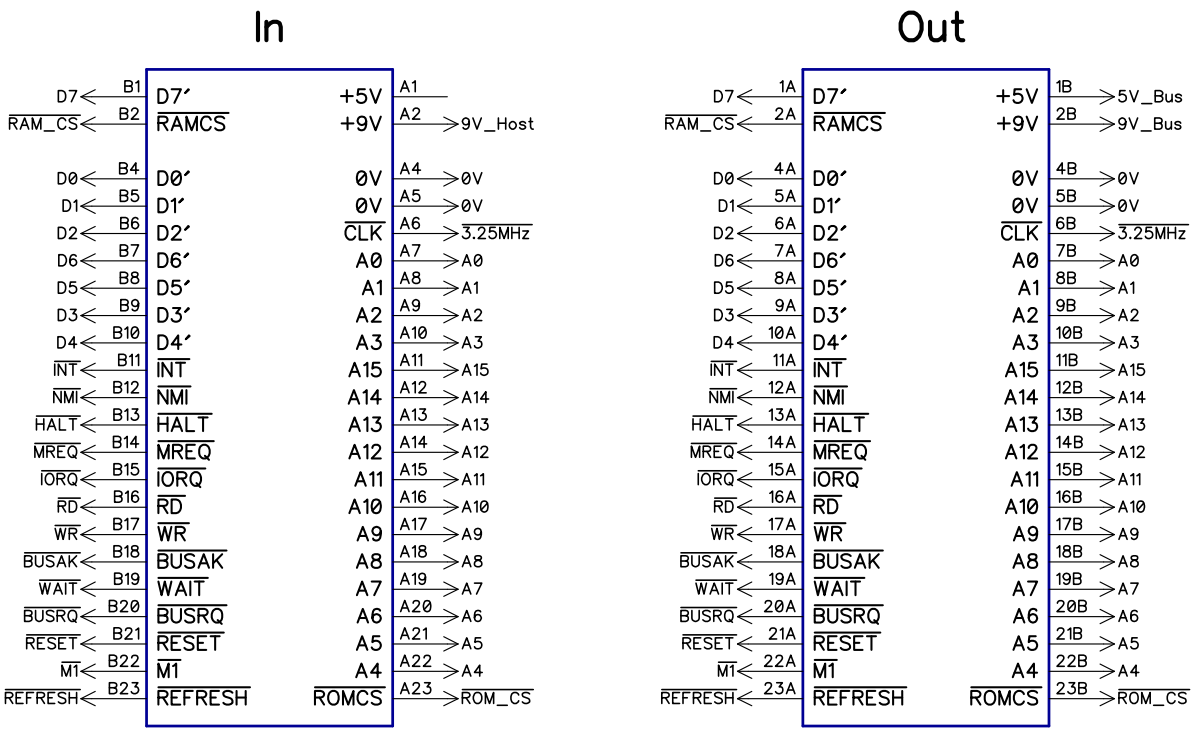
	9V is supplied by the host machine. The DC jack can be omitted.
	9V DC input is centre negative and is separate from the host
	9V DC input is centre positive and is separate from the host
	9V DC input is centre negative and is shared with the host (recommended configuration)
	9V DC input is centre positive and is shared with the host.

In all configurations, 5V DC for the bus is generated by the 7805 regulator from the bus 9V DC supply.

Tynemouth Software

SCHEMATIC

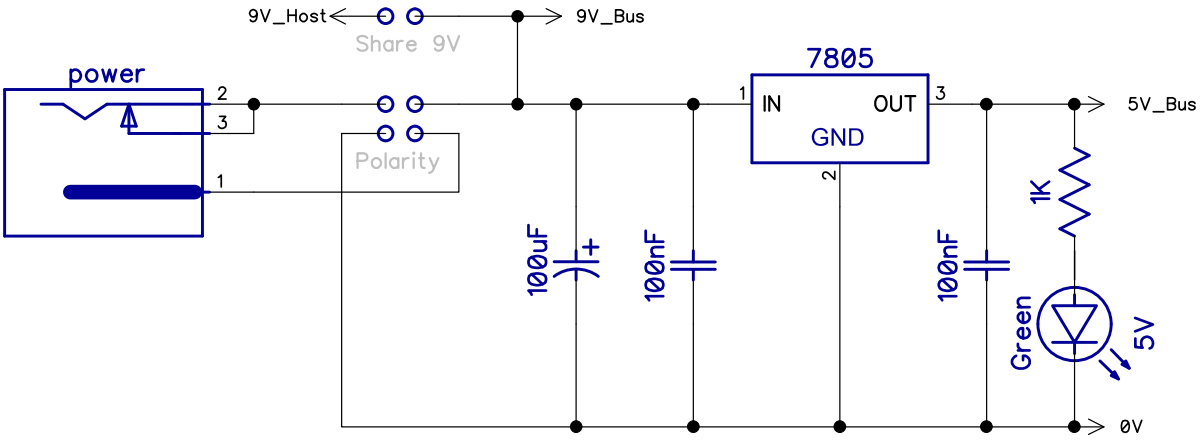
MINSTREL EXPANSION BUS



This shows the input and output edge connectors. All are wired in parallel, with the exception of the 5V and 9V power pins which are different for the input edge connection only.

There is no connection to the host 5V supply, to avoid adding extra load to that.

POWER SUPPLY SCHEMATIC



Tynemouth Software

EXPANSION BUS PINOUT

The expansion bus pinout is identical to that used on the Minstrel 2 and 3 and the ZX81. The ZX80 is the same but without the /ROM_CS pin, but you aren't using this on a ZX80, are you?

Signal (Top / Front)	Pin		Signal (Bottom / Rear)
D7	B1	A1	**5V**
/RAM_CS	B2	A2	**9V**
-			**-**
D0	B4	A4	**0V**
D1	B5	A5	**0V**
D2	B6	A6	**3.25MHz**
D6	B7	A7	**A0**
D5	B8	A8	**A1**
D3	B9	A9	**A2**
D4	B10	A10	**A3**
/INT	B11	A11	**A15**
/NMI	B12	A12	**A14**
/HALT	B13	A13	**A13**
/MREQ	B14	A14	**A12**
/IORQ	B15	A15	**A11**
/RD	B16	A16	**A10**
/WR	B17	A17	**A9**
/BUSAK	B18	A18	**A8**
/WAIT	B19	A19	**A7**
/BUSRQ	B20	A20	**A6**
/RESET	B21	A21	**A5**
/M1	B22	A22	**A4**
/REFRESH	B23	A23	**/ROM_CS**

NOTES:

/INT is hard wired to **A6** inside all of the machines, and is integral to the display mechanism.

/NMI is likewise integral to the display on the ZX81. Neither are therefore easily available for reuse.

/ROM_CS is not connected on the ZX80, but is present on the Minstrel 2 and 3 and the ZX81. It can be used to disable the system ROM to replace it fully, or in part (as it used to add commands to BASIC for example).

/RAM_CS can be used to disable the system RAM.