



1802 can do serial I/O at same time as video. Every 13th HSYNC line is 1200 baud.

D1-D2 OR gate: Can receive serial from 1802MC or PC via USB.

From 1802MC Q serial output

Q sends serial data to BOTH PC and 1802MC connectors.

High for INP or OUT instruction

P4 Power + Serial Connector  
 pin 6 /ON: GND=Run +5=Reset  
 pin 5 TX: TTL serial out  
 pin 4 RX: TTL serial in  
 pin 3 VDD: +5 VDC  
 pin 2 key: (no pin)  
 pin 1 GND: common for +5V

U6: RST=1  
 on Q=262 (60Hz)  
 Q7,Q8,Q14=1  
 or Q=312 (50Hz)  
 Q9,Q10,Q11,Q14=1

U7: Program for 60Hz or 50Hz. A 4K 27C32 could have both.

U8:  
 Bit 0,Q1,R5 latches TVON (1=video, 0=sync only).  
 Bits 1-2 are a divide by 4 ring counter to make Q1-Q2.  
 Bit 7 is the VSYNC latch (1=VSYNC, 0=video, blank).

Video levels  
 White 1.2V  
 Black 0.8v  
 Blank 0.4v  
 Sync 0v

HORIZONTAL TIMING  
 1802 and DOT clock = 4MHz.  
 HSYNC=DOT/256=15.625Hz=64uS  
 or 32 2uS bus cycles/line.  
 This is 24 DMA cycles (75%)  
 and 8 CPU bus cycles (25%),  
 four 2-cycle instructions.

24 bytes/line=192 bits.  
 Use 192 vertical lines for "square" pixels.  
 RAM: 24x192=4608 bytes.  
 If INT handler is active during DMA (to scan keys, serial I/O, repeat lines like 1861) then Main can have 3-cycle instructions but INT overhead is 73%.  
 If INT handler exits when DMA starts, Main must be 2-cycle instructions but INT overhead is only 55%.

Q1-Q14 counter 2223 468002468 2223 4680024  
 /HSYNC  
 /BLANK  
 /DMA-OUT  
 SC1  
 8 CPU, 24 DMA cycles  
 XX\_XXXXXXXXXXXXXXXXX\_X  
 VIDEO

U8,U6 OUTPUTS  
 60Hz: 15.625KHz HSYNC / 262 lines = 59.637Hz VSYNC  
 50Hz: 15.625KHz HSYNC / 312 lines = 50.08Hz VSYNC  
 Q1-Q2 125 KHz  
 Q3 62.5 KHz  
 Q4 31.25KHz  
 Q5 15.625KHz  
 Q6 line 1  
 Q7 line 2  
 Q8 line 4  
 Q9 line 8  
 Q10 line 16  
 Q11 line 32  
 Q12 line 64  
 Q13 line 128  
 Q14 line 256

bottom margin-><-----vertical sync pulse-----><-----top margin  
 /HSYNC  
 /BLANK  
 VIDEO 0 1 2 3 4 5 6 7 8 9 10 11

- Rev.A:
- Cut trace on bottom of board between U11 pins 15-16, and connect U11 pin 15 to GND instead.
  - Add C6 (3300pF) between U11 pin 1 and GND.
  - U7 program allows for U8 to delay /BLANK /SYNC /EF1 RST /BLANK by 1 bus cycle.

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