Tynemouth Software

TYNEMOUTH COMPOSITE VIDEO OUT FOR PET

OVERVIEW

This module can be plugged into the monitor socket of a PET 2001 or 2001N mainboard and will generate an NTSC composite video output suitable for most TVs or monitors.

SUITABILITY

This module is designed to work with the earlier PET 2001 and 2001N mainboards, in machines with 9" monitors.

These are usually badged 2001, 3008, 3016, 3032 and also 4016 and 4032 (but not the 12" monitor versions).

Later 40xx and 80xx models with a 6545/6845 CRTC chip and a 12" monitor are not suitable as the signal polarities and frequencies are different.

PARTS LIST

CAPACITORS – AXIAL CERAMIC RATED 16V OR HIGHER

2 x 2n2 *(usually marked 2n2 or 222)*
2 x 100nF *(usually marked 100n or 104)*
2 x 47µF *(axial electrolytic rated 35V or higher)*

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

1 x 100Ω
1 x 390Ω
1 x 470Ω
1 x 1KΩ
1 x 2.2KΩ



SEMICONDUCTORS

1 x 1N4148 signal diode
1 x 78L05 voltage regulator
1 x 74LS02 quad 2 input NOR gate

CONNECTORS / JUMPERS

1 x clip lead and wire
1 x 7 way right angled 0.1" receptacle *(pin 6 removed for polarisation)*
1 x Phono jack *(e.g. CUI RCJ-011 – Digi-Key CP-1400-ND)*

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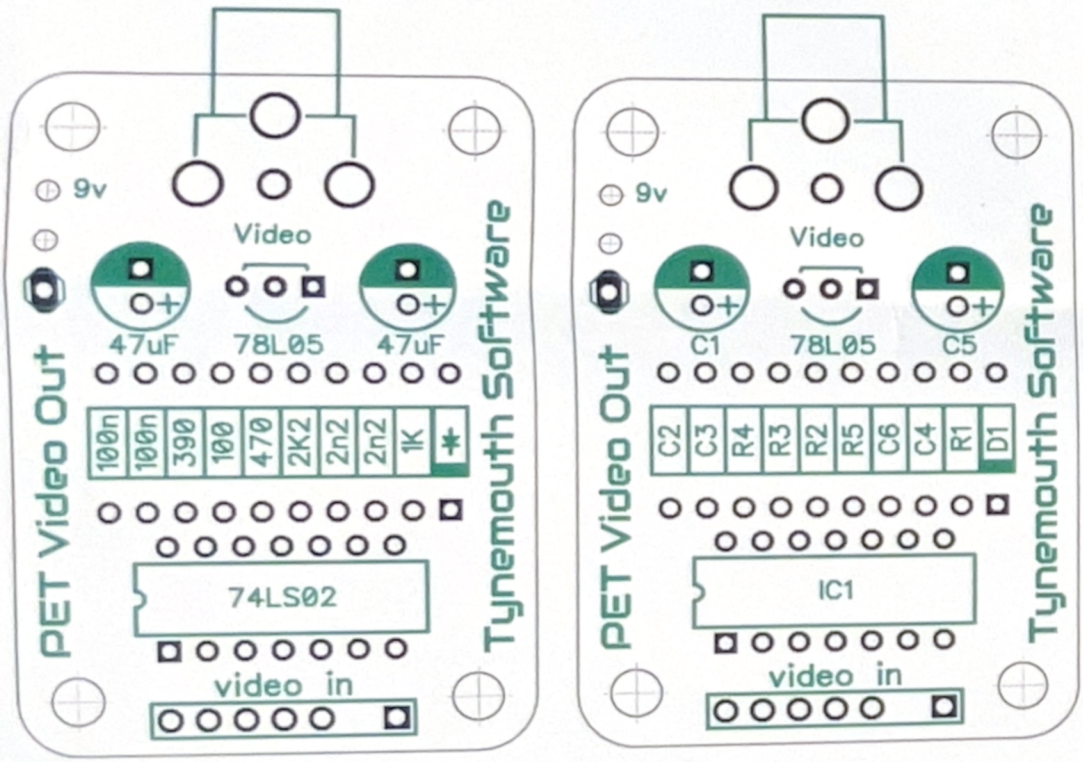
CONSTRUCTION

Start with the resistors, ceramic capacitors and diodes, then the IC. Next move onto the taller components. The voltage regulator first, followed by the electrolytic capacitors and connectors.

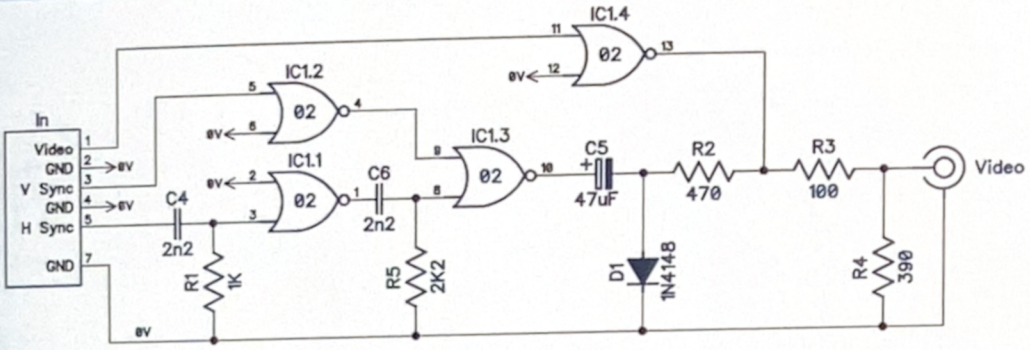
Finally solder the clip to the end of the wire and solder the wire to the board. There are two holes that can be used to feed the wire through to act as a strain relief.

There are mounting holes on the board to mount the module flat somewhere in the case, should you prefer that option. A cable would need to be made up to connect between the 7 pin connector on the board and the PET board - this is not included in the kit.

COMPONENT PLACEMENT AND REFERENCE DESIGNATORS



SCHEMATIC



The video signal is active-low, so the white pixels are low, this is inverted by IC1.4.

There is one active-low vertical sync pulse at the start of each frame this is inverted by IC1.2.

There is one active-high horizontal sync pulse at the start of each line. The pulse the PET generates is a lot longer than normal, and extends into the visible signal.

The R/C circuit of R1 and C4 form a high-pass filter, which generates a short 2us pulse at the start of this pulse. This is inverted by IC1.1.

The R/C circuit of R5 and C6 form another high-pass filter. This generates a 5us pulse, which is will form the horizontal sync pulse.

The delayed pulse positions the text in the centre of the visible area, not offset to the right as the original composite video mixer circuit design published in the Commodore PET Users Club of England Newsletter (issues 1 and 2, page 9).

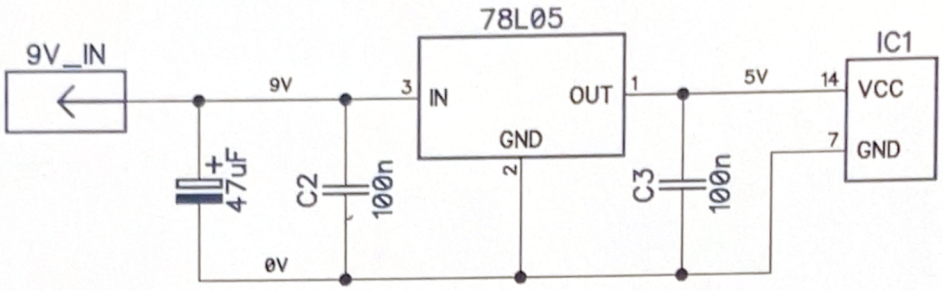
The NOR gate at IC1.3 takes the delayed active-high horizontal sync pulse, and the inverted vertical sync pulse and generates an active-low composite sync pulse.

When there is no sync signal, capacitor C5 charges up via diode D1, and when there is a sync pulse, the positive end is pulled to 0V, so the output is pulled negative by about 0.3V.

This is the combined with the inverted video signal (reduce to about 0.7V) to generate a composite video signal of approximately 1V peak to peak to suit most video inputs.

Composite video to HDMI converters generally do not like monochrome composite video signals like this, so they may not detect the signal.

POWER



The board contains its own 5V regulator, to avoid noise on the video signals from the digital logic.

This is powered from around 9V DC that can be tapped at various points on the board. The easiest is usually the polarity protection diode. This is a single large diode, near the power connector, with the anode to ground, and the cathode to the 9V DC input.

Clip the supplied lead onto the cathode of the diode, indicated by a stripe on the end.

MONITOR CONNECTOR

The module plugs into the monitor connector on the PET 2001 / 2001N board, usually located near the heatsinks or the power connector.

Pin	Signal	Polarity
1	Video	Active low
2	Ground	
3	Vertical Sync	Active low
4	Ground	
5	Horizontal Sync	Active high
6	Key	
7	Ground	

Pin 6 is missing to act as a key to ensure the connector is oriented correctly.