Collection of working TTL Interface circuits

Current Status: Complete/Work in progress/stopped/concept only, untested
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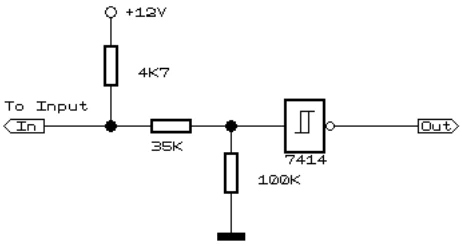
Design summary: Here is a small collection of interface circuits for your own designs. Most are concerned with interfacing to/from TTL logic.

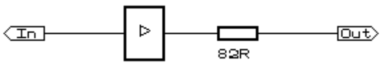
12V to 5V switch.



12V to 5V TTL input circuit

This is used to interface 12V inputs to a computer. By using the 7414 (Hex Schmitt trigger), you get hysteresis of the input. It should switch around 4.2V if I remember correctly

Buffer circuit



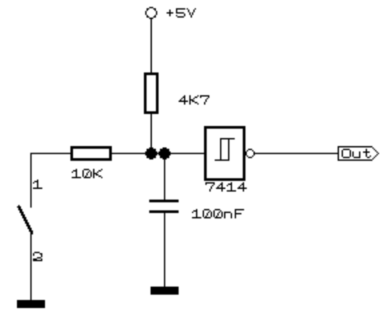
Buffer circuit to drive a long wire

The buffer should be either a 74244, 74245 or a 7407
This circuit can be used for a few purposes.
It can be used to drive a long wire, the 82R resistor is used to match the wire impedance (about 100 Ohms) to the output impedance of the driver (about 25 Ohms).
Later on, a variant of this circuit is used to drive an LED or transistor.

Important technical specifications of the drivers:

Device	Logic 0 current	Logic 1 current
7407	40mA	2 mA
74244	24mA	-24mA
74245	24mA	-24mA

Debounced switch



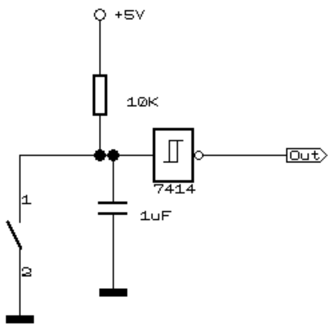
Debounced switch input, suitable for IRQ lines

This is used to interface a switch to a TTL input. It solves the switch debounce problem and as the comment explains, has been used on interrupt lines, where false triggers are not desired.

The switch can be of the push to make momentary type or a normal latching switch.

The 7414 Hex Schmitt trigger adds hysteresis to the system, essential for debouncing

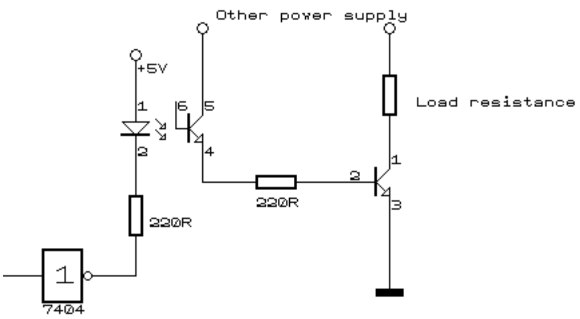
Another debounce switch



Another debounce circuit

A simpler version of the previous circuit

High power opto switch

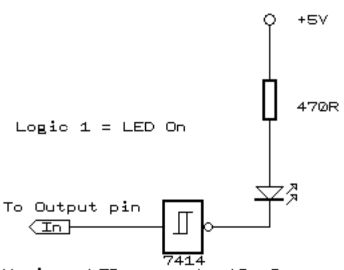


Optocoupler circuit, high power drive
suitable for driving solenoids

This circuit was originally designed to be driven from a data pin of the Amiga parallel port, hence the 7404 buffer to drive the opto-coupler. Pin 5 of the Opto-coupler and the supply to the load (resistanc

The opto-coupler can be any available type. The transistor should be one for the power needed. In my tests I used a BFY50, which is rated at 1 AMP. A 2N2222 or BC108 is suitable for upto 300mA. For

LED driver



Maximum LED current, 16 mA

Why am I including an LED driver?
Again for the Amiga parallel port which can at most supply 3.2mA!

In this configuration, it will supply a current of nearly 5.5mA to the LED.

The buffer can be a 7404 or 7414 as shown or any suitable device capable of sinking at least 16mA of current.

To calculate the LED current use this formula:

$$Iled = \frac{Vsupply - Vled - Vol}{Limit\ resistor}$$

or to calculate the resistor value:

$$Rlimit = \frac{Vsupply - Vled - Vol}{ILED}$$

Where:

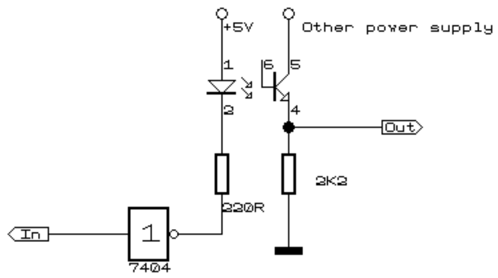
Vsupply = LED voltage supply, typically 5V in a digital system.

Vled = 1.7V for a RED LED and 2V for most other colours except white.

Vol = Maximum logic 0 output voltage, 0.8V according to TTL standards.

NOTE: These LED current equations can also be used with opto-isolators.

Opto circuit #1

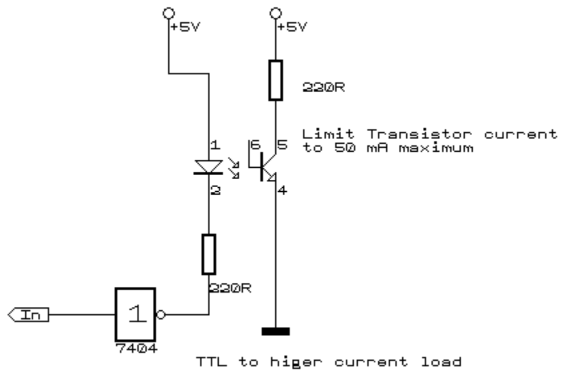


TTL to isolated 'other' signal

This circuit is used to provide an isolated switch to another system. When the Output of the 7404 is at a logic 1, the output is around 0V. When the 7404 is at logic 0, the Output is pulled to the positive su

The 2K2 resistor is used to limit the current when the Opto-transistor switches. The opto-coupler is any general purpose type.

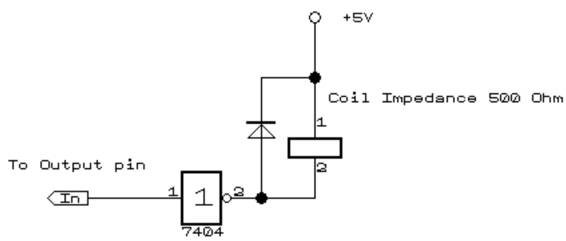
Opto circuit #2



TTL to higer current load

This is a variant of the above circuit to switch higher current loads. Most opto-transistors will switch at most, 50mA so you may need to add another transistor as shown previously.

Reed Relay Driver

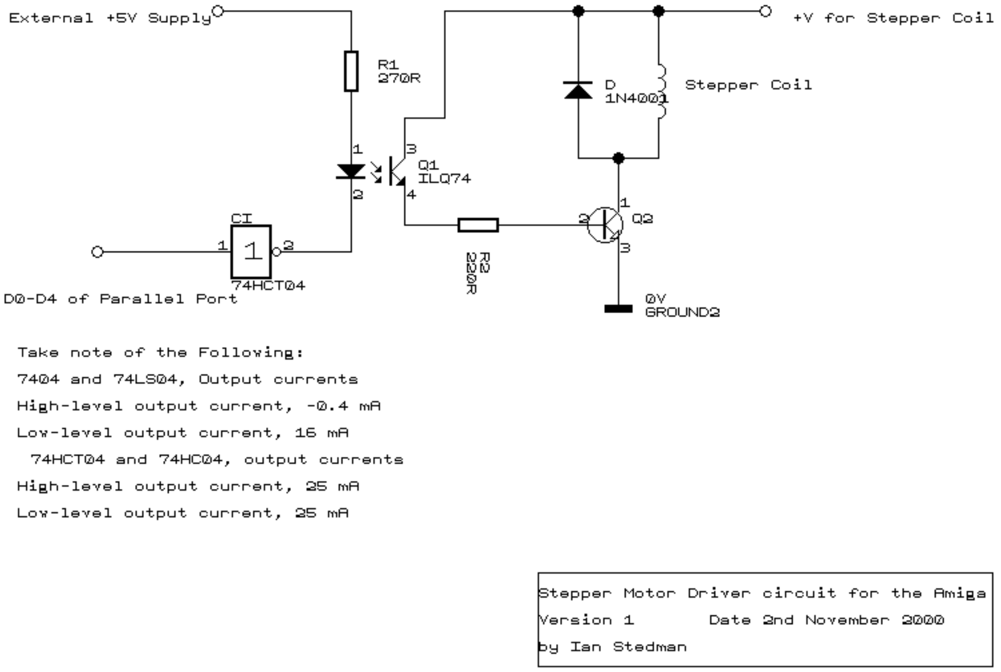


Reed Relay Driver

A reed relay can typically be driven from a suitable TTL driver. The secondary (switched) circuit is not shown here.

The diode is to protect the TTL device from back EMF when the relay de-energizes and should be of the 1N4001 type or similar. A logic 1 at the input switches the relay.

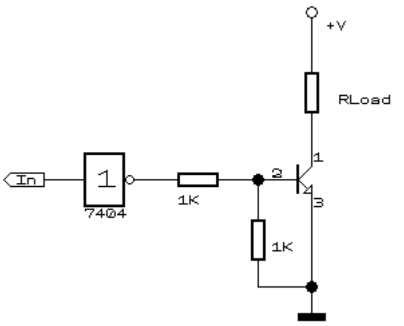
Stepper motor driver



As the name states, it drives a stepper motor!

Q1 is any available opto-isolator, Q2 is a BFY50 transistor or equivalent, capable of switching 1Amp or more.

Transistor Output



Transistor TTL output driver

Finally, a Transistor driver. suitable for switching moderate loads.

The End (for now)

By Ian Stedman, 12th January 2003

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