# Borders Model Boat Club

Reversers and Mixers

Reversers

Reversers do what the name suggests: They reverse the direction of operation of a servo. Before radio sets were fitted with reverse switches for each channel, one either altered the motor connections and the feedback connections inside the servo or fitted one of these devices. Their main use nowadays is where a single transmitter is used to control a number of models, so that the transmitter does not have to be altered every time to suit the model in use.

A simple circuit is shown below, which was commonly used in the 1970s. It has 3 components and is thus simple and cheap to construct. It uses a 4001 quad NOR gate,

The power supply connections are omitted by convention.. +5 volts goes to pin 14, and 0 volts to pin 7 of the integrated circuit.
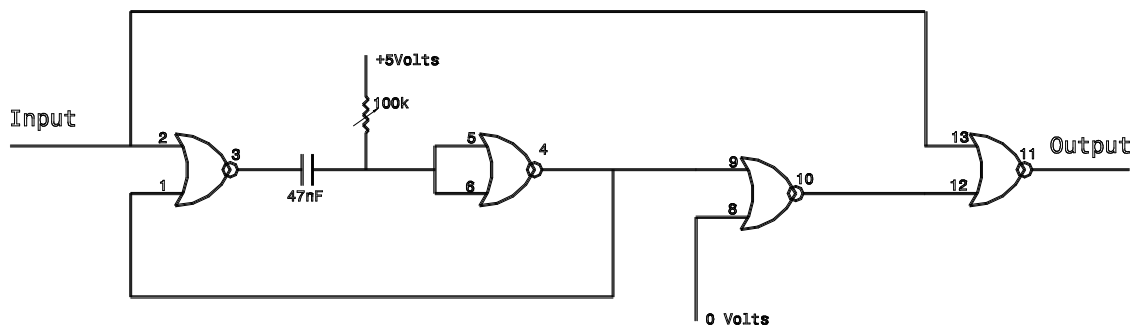
How it works

The receiver sends pulses, which vary in length from 1 to 2 milliseconds, which represent the travel of the servo. Thus 1 millisecond may represent fully clockwise, and 2 milliseconds fully anticlockwise. 1.5 milliseconds will be the central position.

When the circuit receives the pulse, the left hand pair of gates generates a 3 milliseconds pulse. The right hand pair of gates subtracts the incoming pulse length from this to provide the output. Thus 1 millisecond in will give 3 – 1 = 2 milliseconds out, effectively reversing the signal.
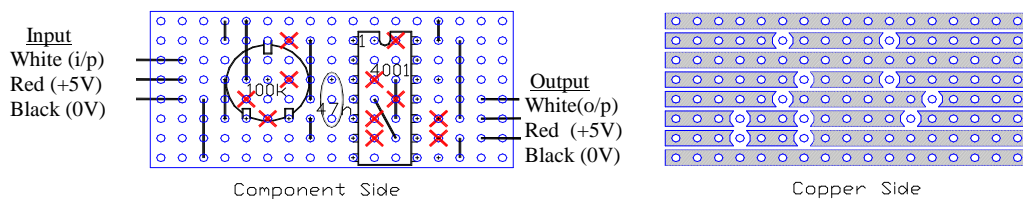
The circuit can be made up on a small scrap of Stripboard (Veroboard). The right hand sketch above shows where the tracks on the copper side must be cut using a 1/8" drill bit. Note the two wire links, which must be fitted first as they will be underneath the integrated circuit. The position of pin 1 of the ic is shown. The actual chip will either have a small hole adjacent to pin 1, or there will be a central notch at that end of the chip.

The variable resistor is adjusted to centralise the servo. This sets the 3 milliseconds pulse length.

A more modern microprocessor based kit for a reverser is available to members of the Borders Model Boat Club.

Mixers

These gadgets perform the same function as the "V-Tail" mode fitted to some transmitters. They read in two channels, say A and B from the receiver and output values A+B and A-B. This enables the two channels on the left hand stick of the transmitter to be used to control two motors. The up/down motion produces the same forward/reverse thrust from the two motors, while lateral movement of the control produces differential thrust, and can be used for manoeuvring the model. The old fashioned analogue circuits to produce this function were quite complex, but modern microprocessor circuits typically only contain two components and should be very cheap.

A typical microprocessor mixer is shown below:
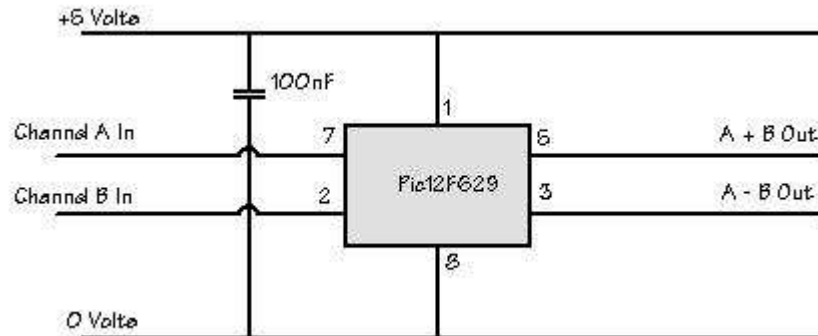
Contact klubsec@btinternet.com for information about a suitable program. (Pre-programmed chips and kits of parts are only available for members of the Borders Model Boat Club.)

----------*Remember that for the circuit to work, a suitable program must be loaded into the microprocessor chip. As supplied they have no program loaded and so are inert.*---------

A modern microprocessor based kit for a mixer is available to members of the Borders Model Boat Club.