

# MkII V Tail Mixer

By  
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## Introduction

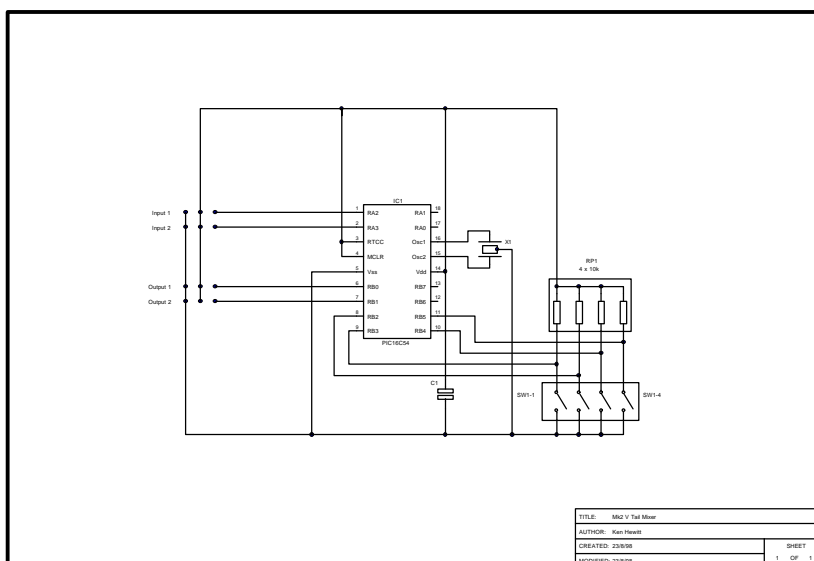
The original V tail mixer was published in the March 1995 issue, this was the first mixer I had designed using the PIC micro controller and it was basic in that it only mixer 50% of both inputs to give 100% outputs. This mixer proved to be one of the most popular projects that I have done and it has been built in large numbers all around the world especially in Scandinavia, South Africa and Australia.

The original design was used by people for all sorts of uses that I had not given a thought to, it was used for twin engine boats to give better steering, some people used it in robots for Robot Wars. I decided it was time to revisit the mixer and apply some of the things I had learnt on later projects to the Mk2 mixer.

The Mk2 is an improvement on the original design in that it allows 4 different mixing ratio's 100+100, 50+100, 100+50 and 50+50 this allows you to have more control of the mixing performed, the Mk2 still also has the reversing switches for the 2 output channels.

## The Technical Bit

The mixer measures both of the incoming channels to the nearest 5uS and then looks at the 2 mode switches to see if either or both of the inputs need to be divided by 2 for 50% mixing, then the 2 input values are mixed to produce the 2 output values. Then the reversing switches are checked to see if the outputs should be reversed or not. The last stage is then that the 2 output pulses are generated for the servo's, once this has been done the mixer waits for the next 2 input pulses and the whole process repeats.

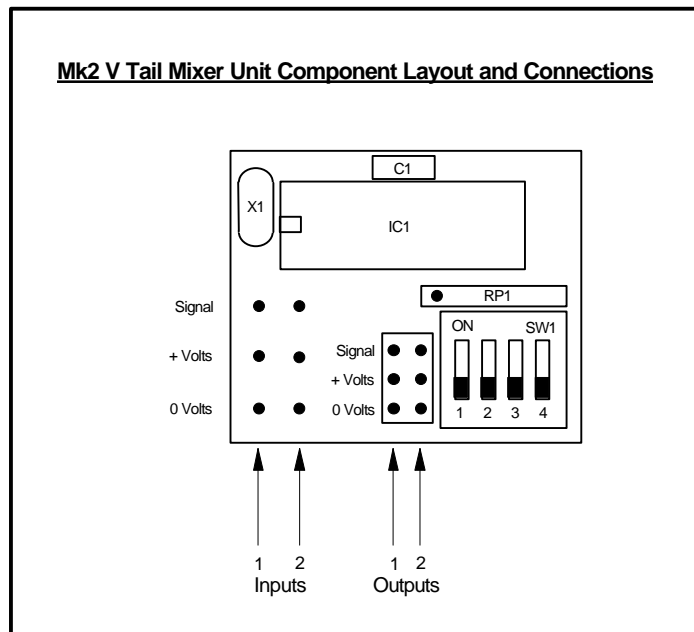


code can be very compact. It also has a wide range of power supply limits, 2.5 volts to 6.25 volts at less than 2mA, making it ideal for use in model avionics systems.

## Assembly

The assembly of the Mk2 mixer is very easy, it only consists of 5 components but 2 of these must be fitted the correct way round, these are the PIC micro controller IC1 and the resistor pack RP1 the orientation of these 2 items is shown clearly in the layout drawing.

The main component IC1 used in this design is a CMOS device and can be damaged by static electricity. When handling this item it is advisable to take some basic precautions, do not wear clothing which builds up a static charge, or handle the item until needed and before you touch it, try to touch a water pipe which should earth any static charge you have built up. DO NOT connect yourself directly to the mains earth.



## Testing

Before anything else check the bottom of the PCB to make sure that there are no solder bridges between pads that may short out the power supply or receiver outputs. Once this is checked and all is correct make sure all of the switches sw1-4 are off, connect two servo's to the outputs and plug the 2 input leads into the selected receiver outputs that you want to mix.

Switch on the receiver and transmitter, the servo's should move as you alter the 2 channels you have selected for mixing, on channel should make both servo's move in the same direction and the other channel should make them move in opposite directions. Both outputs should be giving full output for full input range.

Next switch sw1 and sw2 on, repeat the above test and both servos should move in the same directions as before, but they should only be moving over 50% of their output range for each input, if you move both inputs to maximum then you should get maximum out.

You can now check that when you put either sw3 or sw4 on that each output starts to move in the opposite direction. If all is operating as described then the mixer is fully working.

## Setting the Mode Switch

As mentioned in the introduction the Mk2 mixer has more options, 4 different mixing ratio settings and the output reversing for each channel, this is all set up using SW1-4 according to the following settings.

<b>Mixing Ratio %</b>	<b>Sw1</b>	<b>Sw2</b>
100 / 100	Off	Off
100 / 50	Off	On
50 / 100	On	Off
50 / 50	On	On

<b>Outputs</b>	<b>Sw3</b>	<b>Sw4</b>
1 Normal	Off	----
1 Reversed	On	----
2 Normal	----	Off
2 Reversed	----	On

### **And Finally**

I hope that this new version of the V tail mixer proves to be as popular as the original, and that you have gained an insight into the possible uses of the PIC range of micro computer chips in the world of model avionics. If anyone is inspired into trying to develop PIC based projects for themselves then please don't hesitate to write to me for advice or information about this wonderful little chip.

## Mk2 V Tail Mixer Parts List

		<u>Maplin's</u>	<u>RS Comp/Electromail</u>	<u>Farnell</u>
C1	220nF	RA50E	126-045	146-233
RP1	SIL 10k x 4	.....	.....	219-186
SW1	4 Way DIL switch	JH08J	332-981	693-686
X1	4MHz Resonator 3 leg	.....	.....	295-346
Pin Strip Header		JW59P	.....	.....
Case		JX56L	.....	.....
Servo Lead	Available from local model shop			
IC1	PIC16C52-04/P	Available from author		
PCB		Available from author		
Component kit less case and leads.		Available from author		

### Component Suppliers

All of the components (apart from the PCB and pre-programmed IC1) used in this project are available from:

#### **Maplin and Farnell**

Both Maplin and Farnell will supply goods via a telephone order providing you can give the stock codes for the components required and supply a credit card number. Please note that Farnell supply some of the smaller items in packs of 10 and 50.

Maplin Electronics PLC, P.O. Box 3, Rayleigh, Essex. SS6 8LR. Tel 01702-554000. Maplin's catalogue is available from branches of W.H. Smith.

Farnell Electronic Components Ltd, Canal Road, Leeds, LS12 2TU. Tel 0113 263 6311

#### **RS / Electromail**

RS parts are also available from Electromail using the RS part No, and ordering with a credit card. Please note that RS and Electromail supply some of the smaller items in packs of 10.

RS Components Ltd, P.O. Box 99, Corby, Northants, NN17 9RS. Tel 01536-201201. **Note** RS Will not supply public.

Electro Mail, P.O. Box 33, Corby, Northants, NN17 9EL. Telephone 01536 204555, Fax 0536 405555

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