P82

Micro Motor Mixer
for miniature models

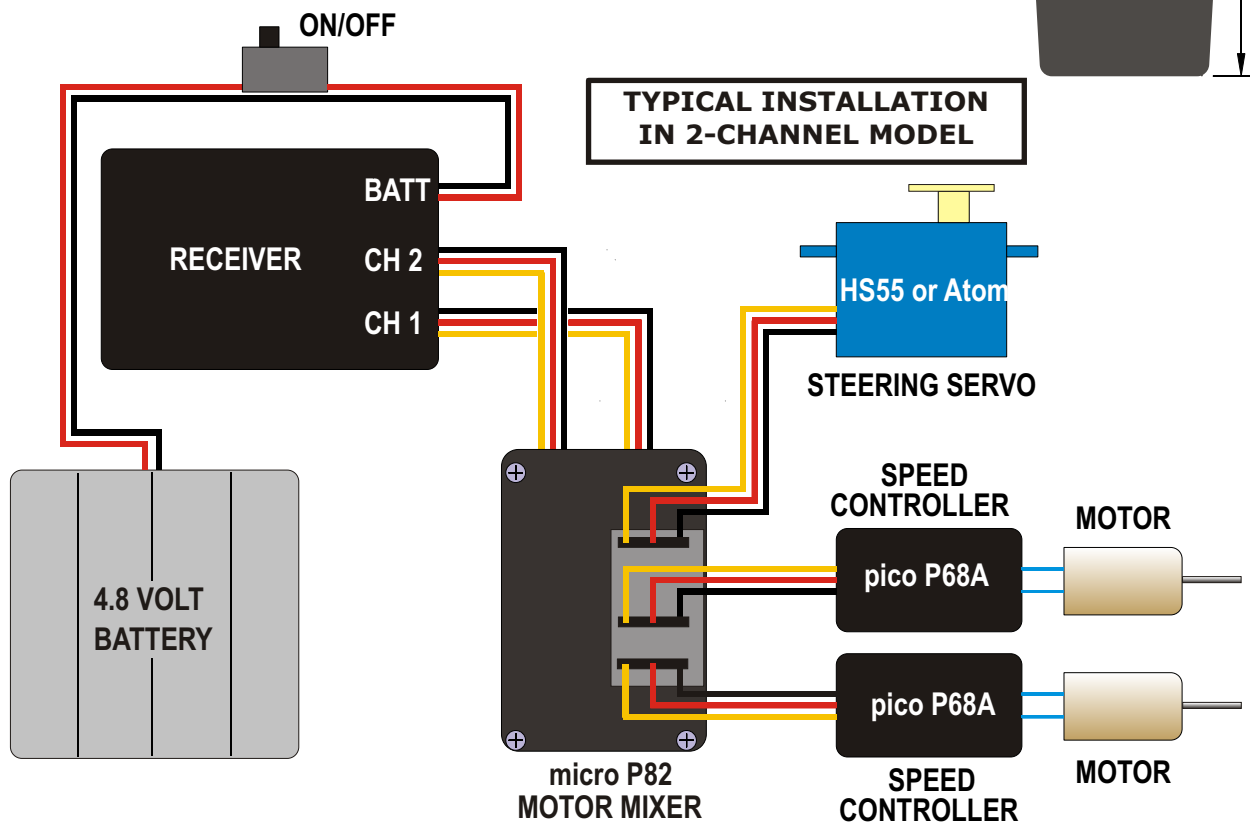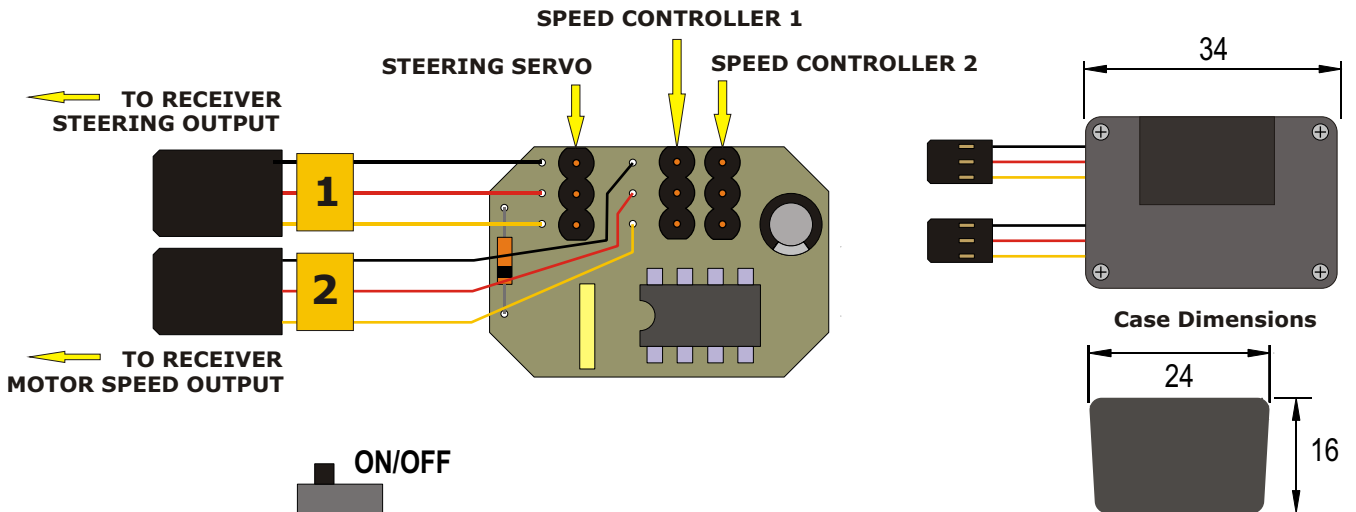**ACTion**
R/C ELECTRONICS

This tiny on-board motor mixer, designed for miniature marine & land models, will enable control of two micro P52A or pico P68A speed-controlled motors. Suitable for boats and other models with tiny motors, it gives differential control in both forward and reverse direction of the two mixed motors. An output connector is provided for the steering (rudder) and connectors for twin speed controllers. It has been designed as a result of demand by modellers who are now building ever-smaller plastic models. The case could be left off, reducing the weight and size. Use "Velcro" pads to mount unit.

REQUIRED INPUT PULSES (BOTH CHANNELS)

Minimum pulse length	0.9ms
Maximum pulse length	2,1ms
Neutral (centre stick)	1.5ms
Maximum receiver voltage*	6 volts (4 x AA Alkaline)
Minimum receiver votage	3.6 volts
Output connections	Two speed controllers & rudder servo

*Do NOT use a 5-cell rechargeable pack or 6v Lead-acid battery to power the receiver *directly;* it will fatally damage the unit. Power *via* a regulated 5v supply such as an ACTion P19 or P99 will be fine.

SPEED CONTROLLER 1
STEERING SERVO
SPEED CONTROLLER 2

TO RECEIVER STEERING OUTPUT

1

2

TO RECEIVER MOTOR SPEED OUTPUT

34

Case Dimensions

24

16

ON/OFF

TYPICAL INSTALLATION IN 2-CHANNEL MODEL

BATT

RECEIVER

CH 2

CH 1

HS55 or Atom

STEERING SERVO

SPEED CONTROLLER

pico P68A

MOTOR

4.8 VOLT BATTERY

micro P82 MOTOR MIXER

pico P68A

SPEED CONTROLLER

MOTOR

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Minimum input signal pulse length	0.9ms
Maximum input signal pulse length	2,1ms
Neutral (centre stick)	1.5ms
Receiver voltage	3.6volts to 6volts volts
Output connections	Two speed controllers and rudder servo
Case size	33mm x 23mm x 16mm

*Do NOT use a 5-cell rechargeable pack or 6v Lead-acid battery to power the receiver *directly;* it will fatally damage the unit. Power *via* a regulated 5v supply such as an ACTion P19 or P99 will be fine.

CONNECTION and TEST
Connect the plugs on the two fitted leads marked 1 & 2 to channels 1 and 2 of your radio control receiver. Connect the two speed controllers and the rudder servo (if used) to the output header pins, ensuring that the leads are fitted correctly as per drawing. Switch on your transmitter and then your receiver, in that order. Move the speed control stick (Channel 2) and note that the two motors run together, forward and reverse. Return the speed control stick to neutral. Now move the steering stick to each side, noting that the steering servo moves but that the motors do not move until you apply a very slight amount of "throttle". When you do, the motors should turn in opposite directions. You may have to swop the motor connections from one speed controller to obtain the correct rotation.

OPERATION
PLEASE NOTE - DO NOT PLUG OR UNPLUG THE CONNECTIONS TO THE RECEIVER WITH RECEIVER POWER ON. IT CAN CAUSE FAILURES OF MICROCONTROLLERS. ALSO NOTE THAT IF THE P82 IS SWITCHED OFF, YOU MUST WAIT ONE MINUTE BEFORE SWITCHING IT BACK ON AGAIN TO ALLOW THE LARGE INTERNAL CAPACITOR TO DISCHARGE.
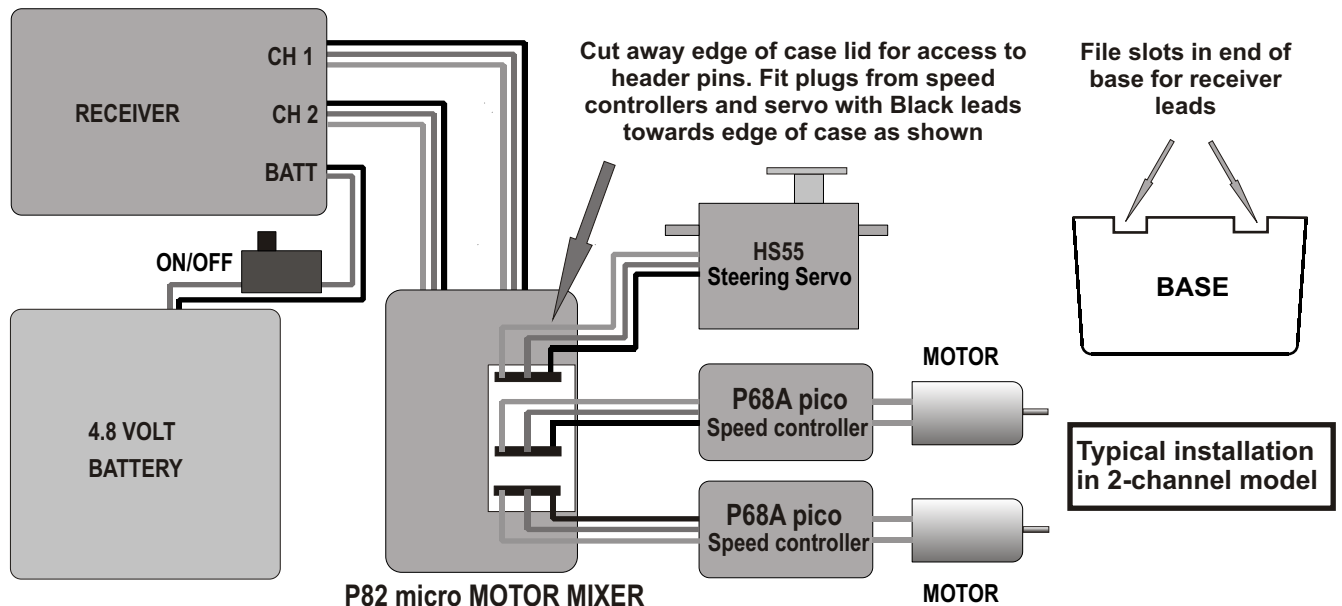The object of the exercise is for you to take careful note of which motor output is slowed down with a given direction of steering; this is the information you will need when connecting the unit eventualy into your model. There are no hard and fast rules; you may be using counter-rotating propellors, in which case one motor output will have to be reversed with respect to the other.

RECOVERY SERVICE
A recovery or repairs service ensures that you will not be left with a dead unit for any reason. The Service Charge for this kit is £11.00 including parts (including return shipping cost IN UK).
All returns should include full Credit Card details (Name & Address of cardholder, Card Number, Expiry Date and Card Security Number)

ACTION R/C ELECTRONICS, 1 Llwyn Bleddyn, Llanllechid, Bangor LL57 3EF, United Kingdom

Cut away edge of case lid for access to header pins. Fit plugs from speed controllers and servo with Black leads towards edge of case as shown

File slots in end of base for receiver leads

RECEIVER — CH 1 / CH 2 / BATT

ON/OFF

4.8 VOLT BATTERY

HS55 Steering Servo

BASE

MOTOR

P68A pico Speed controller

P68A pico Speed controller

MOTOR

P82 micro MOTOR MIXER

Typical installation in 2-channel model

ACTion units shown are polarity-critical! Take care to connect them correctly!

ACTion
R/C ELECTRONICS

P82 "micro" MOTOR MIXER
Instructions for Kit version

Component Layout

BLACK
RED
WHITE

1

BLACK
RED
WHITE

2

H1   H2   H3

+
C2
-

D1   C1   IC1

KIT VERSION ONLY
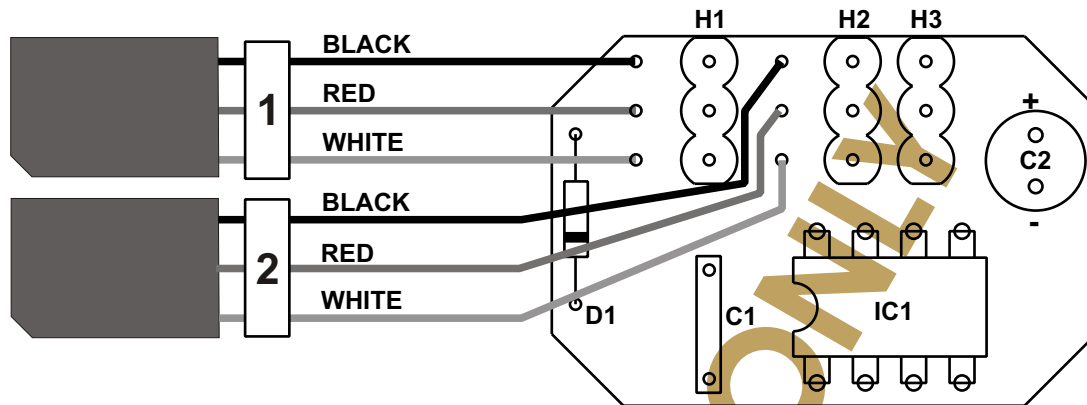
Re-solder **Good joint** **Re-solder**

✗   ✓   ✗

PCB

Copper pad   **Trim**

Soldering Tips

ELECTROLYTIC CAPACITOR C2

HEADERS H1- H3

CAPACITOR C1

DIODE D1

NEGATIVE BAND
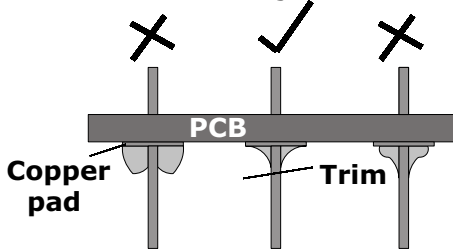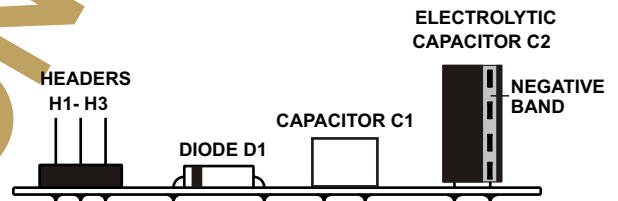
Component mounting details

PARTS LIST

IC1	PIC12C508 (programmed) with 8 pin IC socket
D1	1N4148 diode (small glass component)
C1	0.22uF poly capacitor (marked .22J63)
C2	100uF x 10v electrolytic capacitor (marked 100uF)
H1,2,3	3-way gold plated header (connector)
PCB	Type P82
CASE	RX 2005
SERVO LEADS (2)	Generic Futaba type supplied with the kit, with markers 1 & 2

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P82 KIT INSTRUCTIONS

REQUIREMENTS
This microcontroller 'twin motor mixer' requires a standard digital 1 to 2 millisecond positive input with 1.5 millisecond neutral. The receiver voltage should be between 3.6 volts and 6 volts *when fully charged*.

WARNING - The 8-pin black moulded block with the code PIC12C508 must be left in the conductive black foam until it is required to be fitted. It is a MOS device and is sensitive to static electricity. You will be instructed in these notes how to fit it with no risk of damage. All kits have a tested and proved device supplied, any damaged devices will be charged for and will cost a substantial part of the kit price. The foam is conductive; do not use it as a packing in a case with a powered-on circuit board.

TOOLS
For construction you will require a soldering iron (anything between 15 to 30 Watts with a thin pointed bit) and flux cored solder (22 SWG recommended). A small pair of wire cutters to trim wires covers all the tool requirements plus, of course ,a good level of lighting.

PCB
The PCB for this project is made from the finest glass fibre material and is fully prepared. It requires no further work.

PARTS
- The PCB has an insulated (Component Side) and a tinned track side. Components are mounted on the insulated side and soldered on the track side.
  - The 8-pin integrated circuit IC1 is a microcontroller known as a PIC; its type code is printed on it. It will eventually mount into the 8-pin socket provided. Fitting the IC is normally the last operation in construction to avoid unnecessary handling. Both the IC and the IC socket have a small notch at one end; this is an orientation mark. The socket must be fitted with the notch as per the drawing then, when the IC is fitted with its notch in the same direction, it will be the right way round.
  - The black plastic sleeved aluminium component with two wires at one end is C2, an electrolytic capacitor. It has a band marked down one side of the sleeve with (-) signs printed on it. These signs denote the NEGATIVE lead. The other lead of course is POSITIVE. The positive lead is the longest, and the + and - signs are clearly marked on the drawing.
  - The small square plastic-coated two legged device marked .22J63 is C1, a poly capacitor.
  - The gold plated three-pin connectors (H1, H2, H3) are known as headers. There are three in this kit.
  - The small glass rod with two connection pins is a diode D1. Note that it has a dark bar at one end; this is a polarising mark and is shown as a black band on the drawing.

CONSTRUCTION
The PCB has a plain insulated side which is where the components are mounted, and a side with soldered tracks which is where the components are soldered.
Construction of the PCB is very straight forward, the components being easy to fit in any order. For those who would prefer a set of instructions, the following list is recommended:
- The 8 pin IC socket can be the first item. Note that the notch moulded into it matches the notch position marked on the drawing. This is most important as incorrect fitting will cause the microcomputer to be fitted the wrong way round. This will damage the microcomputer, and they are *expensive*. When you are sure that it is in the right position and the right way round, solder all pins carefully.
  - Fit and solder capacitor C1, either way round as per the drawing, cutting off the spare wires after soldering.
  - Fit and solder C2 next. Note that the long wire is (+) and the (-) is marked on the sleeve. Again cut off the spare wires.
  - The three-legged connectors H1 H2 & H3 can be fitted now. Ensure that the short pin end goes through the PCB for soldering, leaving the long pin ends sticking up. These are the pins to which you will eventually connect your servo and speed controller leads.
  - Diode D1 can now be soldered in. Note that the dark band on the component must match the black band on the drawing.
  - Servo leads to suit your outfit can now be fitted with reference to the drawing. Ensure that you get this right as it can cause a lot of problems if you get it wrong.
  - IC1 is the last part to fit. USE A SHEET OF ALUMINIUM, COOKING METAL FOIL WILL DO. Place it on the work surface. Place the PCB, solder side down on it. Place the black conductive foam on it and rest your hands on it, holding them there while you read through this part of the instructions. The PCB, the PIC 16C52 micro and you are now all at the same potential, i.e. any static voltage difference is now neutralised. You can now remove the PIC16C52 from its foam and fit it into the pre-soldered socket, ensuring that the notch is in the same direction as the notch on the socket.
  - Now double check that everything has been fitted correctly and that all joints are good. The back of the PCB can be cleaned off with the help of an old toothbrush or similar and spirit cleaner (meths or, better still, isopropyl alcohol if you can get it).
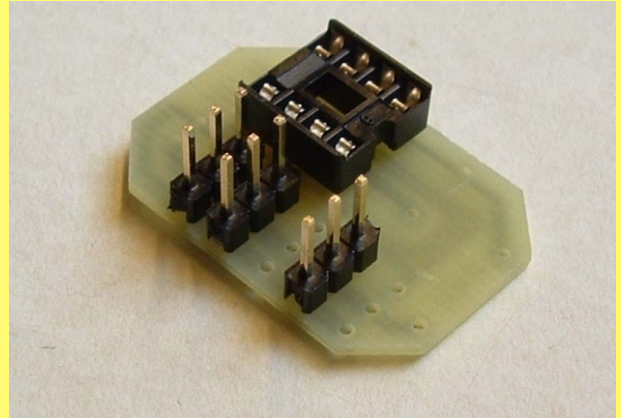
WARNING - REMOVE THE CUT OFF WIRES & ALUMINIUM SHEET FROM THE WORK AREA BEFORE TESTING!
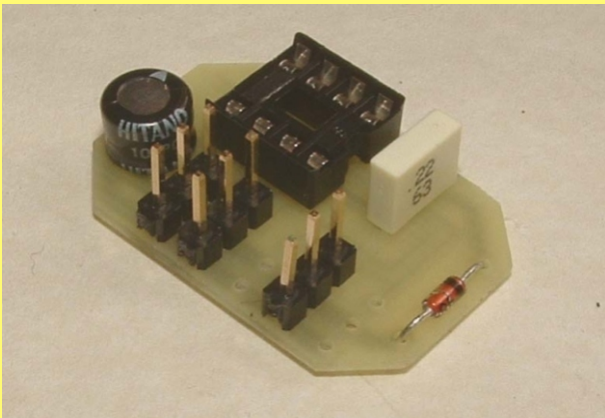
P82 MICRO MOTOR MIXER

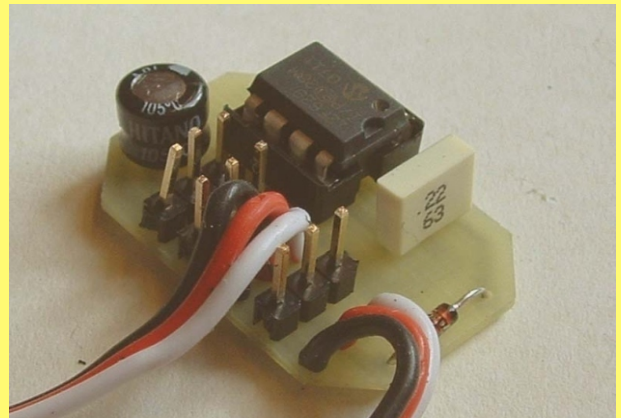## *PHOTOGRAPHIC BUILD SEQUENCE FOR KIT VERSION ONLY*
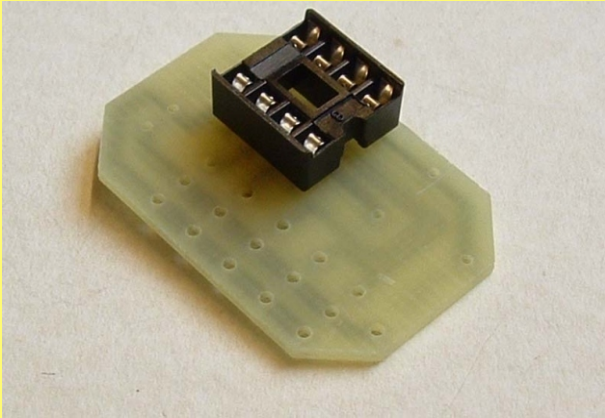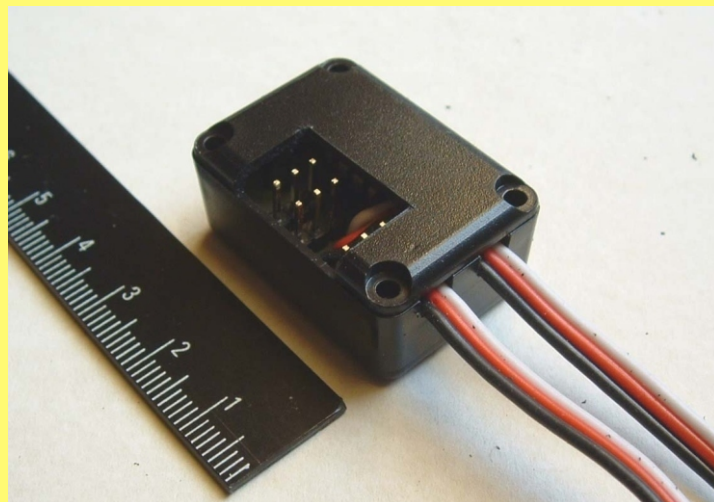

PICTURE 1: PCB with I/C socket fitted

PICTURE 2: Fit 3 x 3-pin headers

PICTURE 3: Capacitors and diode added

PICTURE 4: Fit 2 x leads; plug in PIC chip last NOTE! ANTI-STATIC PRECAUTIONS REQUIRED.

PICTURE 5: Cut away lid to clear leads and plugs to ESCs and rudder servo. File base to suit receiver leads