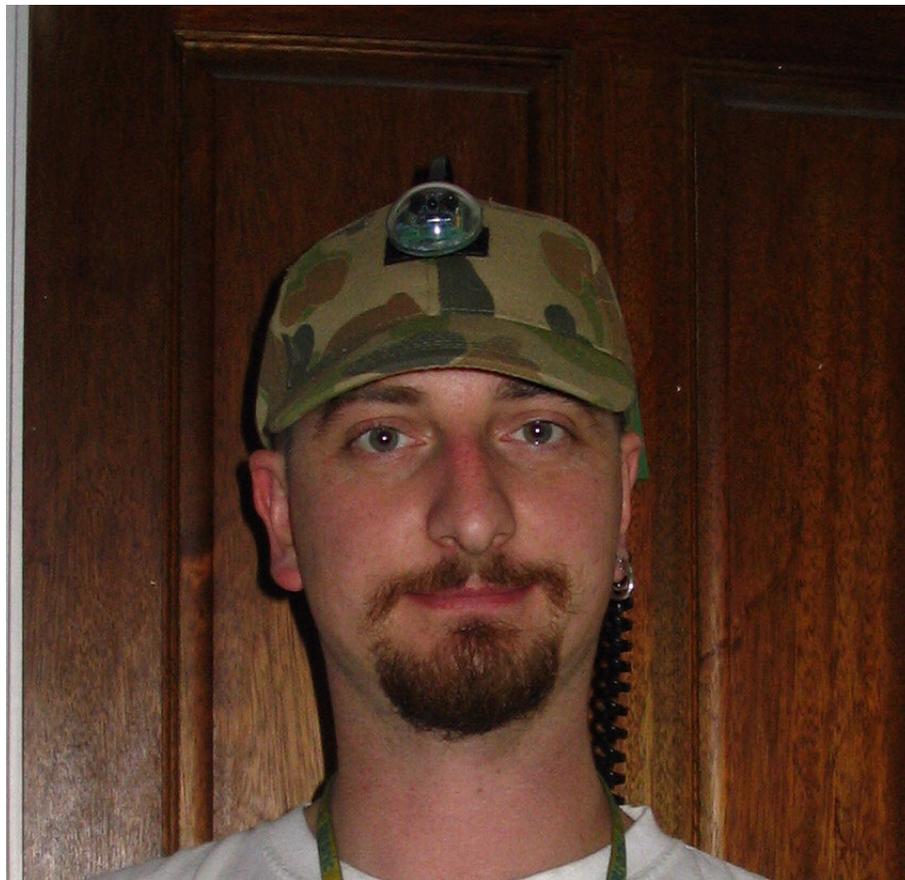




# FragTag Sensor Kit Assembly Guide

Version 1.2 FragTag 19-04-2006



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### FragTag Sensor Kit Assembly Guide

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July 2005 Melbourne, Australia.

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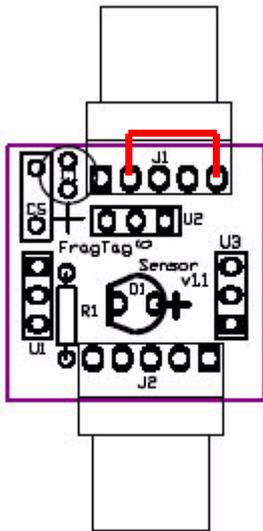
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# Circuit Board Assembly

Please read through the entire document before beginning any assembly work.

1



Insert wire link as indicated in red in only one of the sensor PCB's, this will be the front (terminating) sensor.

\* Note \* the wire link is not indicated on the screen print on the top of the PCB

R1 - 10 ohm resistor

C1 - 45 uF electrolytic capacitor

C5 - 0.1 uF monolithic capacitor

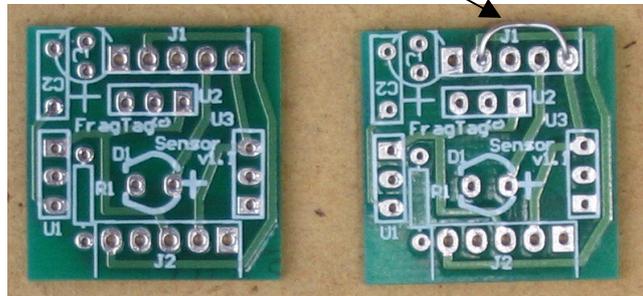
U1-U3 TSOP's

D1 - LED

J1-J2 interconnecting wire termination points

2

Terminating sensor wire link



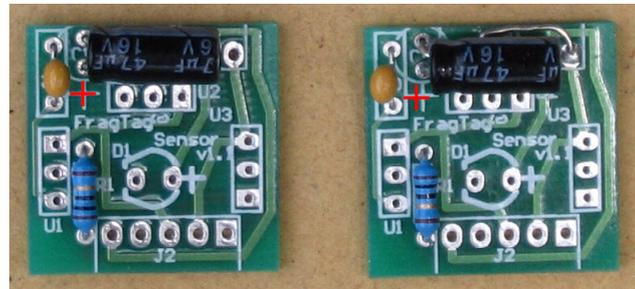
\* Note \* One sensor circuit board must be designated the front or terminating sensor. This sensor must have a wire link inserted as highlighted above. This terminating link is from pin 2 (counting from the leftmost pin) to pin 5 (rightmost pin) on the area designated as J1. Also ensure the wire link does not make contact with the other connector pads on J1.

3



Bend electrolytic capacitors legs at 90 degrees. With the negative polarity strip facing up, the legs should be bent to the right as shown in the picture.

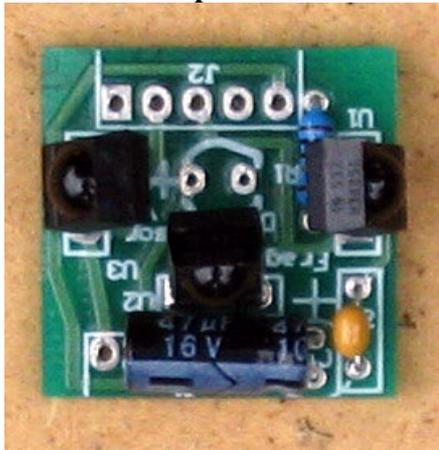
4



Insert the resistor, monolithic capacitor and the right-angled electrolytic capacitor so that all components are as flush to the PCB as possible. Take note of the polarity of the electrolytic capacitor (red cross in picture above denoting the positive lead).

**5a**

**Top View**



Insert the TSOP's as shown with the face (domed section) facing outward. The side TSOP's are inserted all the way down into the PCB. The front TSOP is inserted as far down so as the dome section has clear field of view over the electrolytic capacitor.

**5b**

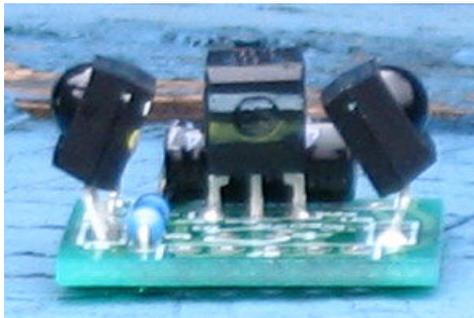
**Side view**



All TSOP's are bent backward approximately 30-45 degrees as shown in pictures 5a-c.

**5c**

**Rear View**



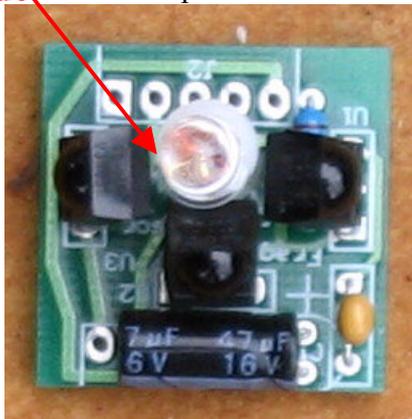
**6a**

Thread the LED legs through the provided 12mm spacer as shown above

**6b**

**Anode**

**Top View**



Insert the LED so that the + Anode (longest leg of the LED) is inserted into the PCB at the designated +ve hole.

**6c**

**Rear View**



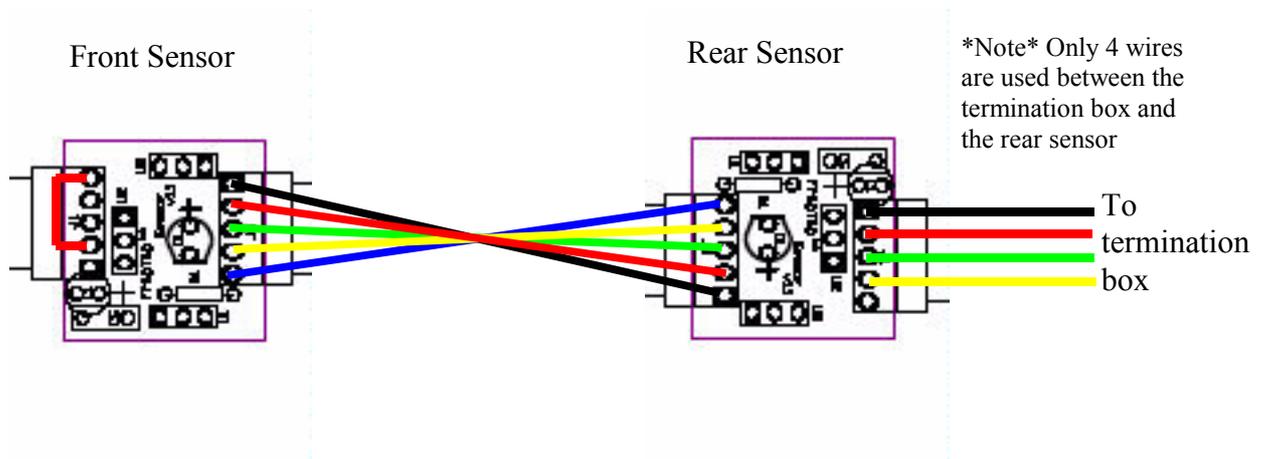
## Wiring Assembly



Carefully measure and cut the lengths of flat cable for the termination box to rear sensor and the rear sensor to front sensor links as suited for your hat size. Shown above is an example hat configuration and placement of sensor modules. \* **Note** \* Hat is **Not Supplied** in the FragTag Sensor Kit.

\* **Note** \* If your planning on adopting the advanced dome assembly method, read and prepare the sensor bases first and remember to thread the cable through the bases before terminating them to the sensor PCB's.

For the rear sensor (the one without the terminating wire link), carefully bend the electrolytic capacitor up to reveal the wire termination points. Terminate the wires, colour-coded as shown below. Terminate the tail from the rear sensor to the termination box supplied, colour-to-colour (i.e. blue to blue, red to red etc.).



## Sensor Housing Construction and Assembly

Provided below are 2 alternative methods for assembling the sensor housings.

### Basic Method A

Advantage – easy construction

Disadvantage – cable retention poor

#### A1



Using a small triangular file, etch 3 small grooves for the cable to pass through. The depth of these grooves should be shallow enough that the 'teeth' created grab the cable without piercing the outer insulation when the dome is attached to its base.

The rear sensor dome will require two of these openings cut into opposite sides. The front sensor needs only one.

### Advanced Method B

Advantage – Excellent cable retention

Disadvantage - requires specialised tools for construction

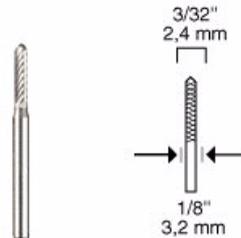
#### B1

This method requires the use of a high-speed rotary tool such as a Dremel® and appropriate accessories.



\* Note\* this method also requires that the sensor bases are completed and attached to the wiring prior to the wire being terminated on the sensor circuit boards.

The rotary tool bit accessory required to complete this method is:



Dremel part #9904

You will also require a 1.0mm drill bit.

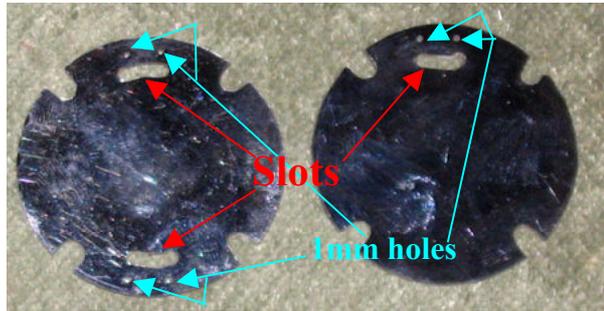
## A2

Glue the completed sensor circuit board (complete with wiring) onto the sensor base using a non-conductive adhesive (e.g. hot-melt glue or RTV silicon rubber sealer). When these are dry, glue the domes in place using a suitable adhesive like Araldite© or an acrylic bonding agent. You may wish to clamp the domes in place as they dry, if you do be careful not to apply too much pressure to the dome surface, as it will crack. A suggestion is to place a plastic bottle cap on top of the dome to distribute the clamping pressure.

Suggestion: To fix the sensors to your hat, you can attach Velcro and backing to the hat. Or, use the method from the advanced technique of filing 4 slots at equal and opposite sides and use screws to attach the sensor to your hat.

Your done!

## B2



Cut 2 slots in the rear sensor base and one slot in the front sensor base for the flat cable to pass through as shown using the cutting bit (9904). This slot should be only just wide enough to pass the cable through. The location of these slots should be ~8.5mm from the outside edge so that the dome clearly covers both slots and there is clearance for the PCB on the sensor base itself. Using a 1.0mm drill bit drill two holes between the slot and the outside edge – these will be used to pass some small wire through to clamp and hold the flat cable in place.



## B3

Cut the provided wire into 3 equal lengths.

Bend each wire length in half and insert through the bottom of the base

## B4



Apply pressure to the base as the wire legs are twisted together tightly and folded over.

## B5

Glue the completed sensor circuit board (complete with wiring) onto the sensor base using a non-conductive adhesive (e.g. hot-melt glue or RTV silicon rubber sealer). When these are dry, glue the domes in place using a suitable adhesive like Araldite© or an acrylic bonding agent. You may wish to clamp the domes in place as they dry, if you do, be careful not to apply too much pressure to the dome surface, as it will crack. A suggestion is to place a plastic bottle cap on top of the dome to distribute the clamping pressure.

## B6

Either cut holes or insert round metal eyelets (available from any haberdashery, sewing supplier or craft store) into your hat to thread the screws through (as shown below).

**B7**

Suggestion: To fix the sensors to your hat, you can attach the provided self-adhesive Velcro© to the underside of the sensor base and sew the backing to the hat.