Transponder function

Indicator Lights

Screws to remove cover for battery replacement
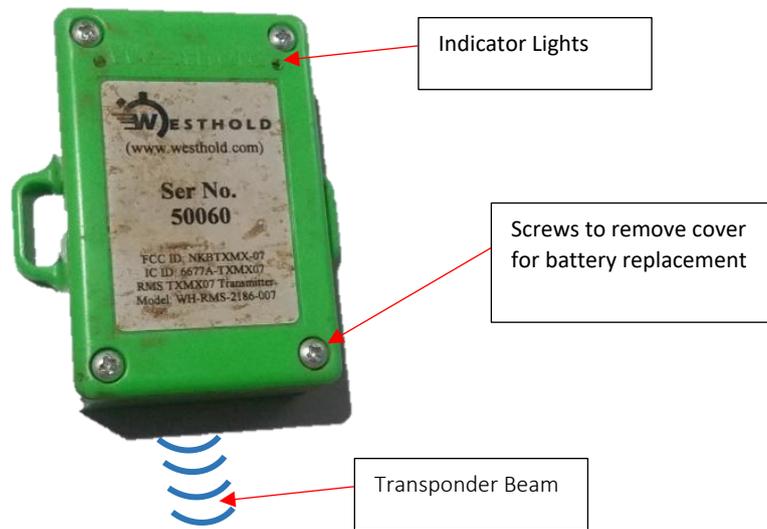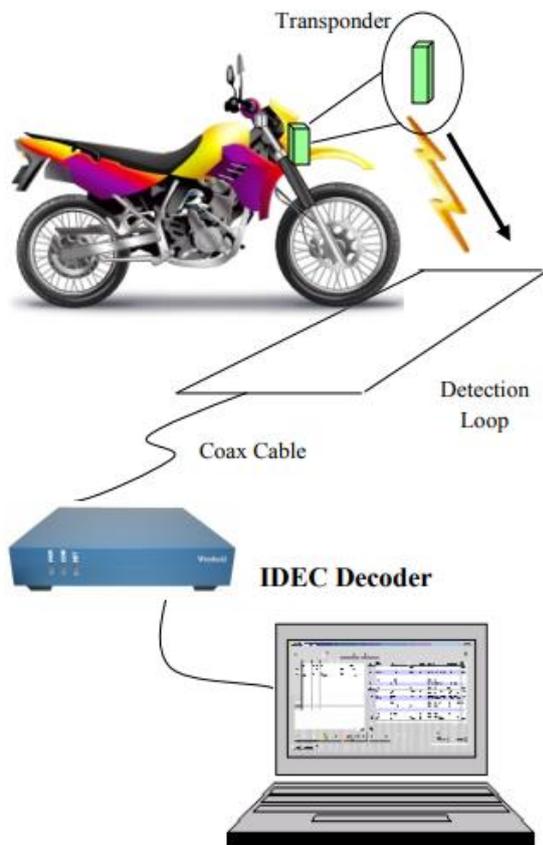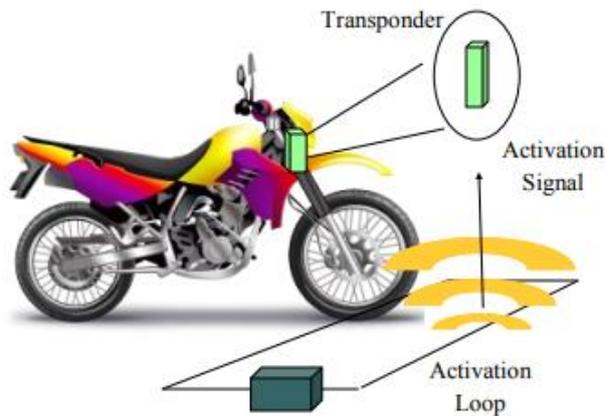
Transponder Beam

The transponder works by transmitting a beam from the bottom, which interacts with a wire loop places under the track surface at the start/finish line. For this reason, the transponder needs to be mounted vertically, and with a clear path to the track. This provides the highest reliability, as the chance of missed passes is reduced significantly.

1. When transponder goes over activation loop, it is detected by IDEC decoder

2. Race Manager software displays on PC

3. Race Manager sends data to scoreboard, internet and wi-fi network.

The transponder is automatically switched on when it is taken over another loop under the ground at the entry to the out grid transponder

Activation Loop

Transponder

Activation Signal

Activation Loop

1. Activation signal turns transponder on.

2. The transponder is active for 1 hour. If it hears the signal again, it will reset for another hour.

Once inside the out grid, the green indicator lights must be checked to make sure that the transponder has been activated before the karts go out onto the track. That way if there is a problem, the transponder can be swapped out before the race starts.

12/03/2018

Transponder location

Various locations have been tested, with the following outcomes:

1. The Nassau panel is a good protected area for mounting, but problems can occur if it does not have a clear enough line of sight to the track (Has to transmit though the floor pan, or legs etc.).

2. Behind the front bumper is a good spot to mount the transponder from an operational point of view. However, if they are mounted to the front bumper then the risk of damage from impact and water/mud is too high.

3. The rear of the seat has proven to be a good location for damage and signal, but it is difficult to get consistency of mounting. It is also a long way from the front of the kart, which is where a manual lap scorer would deem a kart to be in front.

4. The side pod area gives a very good signal, but a lot of mechanical protection is required.

The Nassau panel has been decided as the best option of the above. This has been decided to avoid transponders from having to be put in a risky spot to remain competitive, for example, If someone puts a transponder on the outside of their front bumper, they will cross the line first and have an advantage over anyone who does not want to take that risk. This is also important as the reliability of the whole timing system depends on the reliability of the transponders.

Error due to location

For every mm that you transponder is moved back, the following delay in the finish time occurs:

Speed	Distance	Time to move 20mm	Time to move 100mm
60 km/h	16.67 meters/sec	0.001 s (1.1 milliseconds)	0.006 s (6.0 milliseconds)
70 km/h	19.44 meters/sec	0.001 s (1.0 milliseconds)	0.005 s (5.1 milliseconds)
80 km/h	22.22 meters/sec	0.0009 s (0.9 milliseconds)	0.004 s (4.5 milliseconds)
90 km/h	25.00 meters/sec	0.0008 s (0.8 milliseconds)	0.004 s (4.0 milliseconds)
100 km/h	27.78 meters/sec	0.0007 s (0.7 milliseconds)	0.004 s (3.6 milliseconds)

I.e. if you cross the finish line at 90km/h, and you have your transponder 420mm behind the front of your kart instead of exactly 400mm, you will be timed to have finished the race 0.0008 seconds (0.8 milliseconds) slower than if you had it 400mm behind the stub axle.

Note: This only applies to the finishing position when the kart crosses the line on the final. Each lap time will not be different as the lap would have started 0.8 milliseconds later. Time trials and lap times are not affected by the transponder position at all.

This shows that having your transponder exactly as far forward as it can be is not that critical, and extra effort can be put into positioning it in a place that is secure, out of harm's way if you prefer.

This will also be important if the transponder signal is low, as the position may need to be moved to get a better path to the track.

12/03/2018

Cover options

There are a variety of cover options if extra protection is required:

Ziplock bag

A 100mmx75mm zip lock bag can be used as extra protection of the transponder from water damage

Hard enclosure

A hard enclosure can be brought from Altronics for $15, or Ebay for around $5

105x75x40 is the size sown in the photos below, and is the recommended size.

Clip seal container

The transponder can be placed inside a Clip seal container such as the RCT2 from the reject shop.

Padding such as foam will be needed to secure the transponder into the container.

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