



# Trolley Scan (Pty) Ltd

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## Tests on a timing module for sports timing



Trolley Scan have been testing their UHF RFID system together with their Ecosportstag for use as a core timing module for building into a sports timing system. The results shown here are based on tests in Observatory, Johannesburg, South Africa in June 2004.

The system operates by sending out an energising field from a set of antennas mounted on a gantry over the timing line. When the transponder receives sufficient energy to operate, the transponder sends its identity to the reader which passes the information onto a computer within 1 millisecond of receiving the data. Based on the tests conducted in this paper, the motorcycles were read from 10 meters before the gantry across a 4 meter wide track at speeds up to 40kph. Tests show that there is no speed restriction on operation and speeds over 100kph should be within the capabilities of the system.

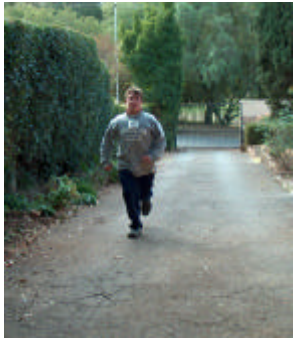


Part of the performance achievable is due to the correct mounting of the transponders on the vehicle/person. This is a key factor in making this core system into successful timing system. The system can handle up to 500 transponders in the field at the same time.

## Tests on a motorcycle at speed

Tests conducted on a Suzuki 200	
Motorcycle read at distance of 10 meters before timing line. This distance can be reduced by redirecting the antenna beams downwards from their forward looking position in this test. These tests were done at 40kph.	

<p>Transponder mounted on headlight of motorcycle</p>	
<p>Transponder mounted on headlight of motorcycle</p>	

**Tests on athlete running**

<p>Detection range for transponder attached to chest with suitable backing was 6 meters from gantry</p>	
<p>Transponder was stuck to chest of athlete</p>	
<p>Transponder has two layers of packing material behind the transponder to space the transponder away from the body of the athlete</p>	

Back of transponder on athletes chest showing the two layers of non-absorbent packing material to keep the transponder away from the athlete.



### The timing setup used

The system comprised of a gantry mounted 3 meters above the track (top right) holding three patch antennas (2 transmit and one receive) and our fixed reader (middle of picture) coupled to a laptop computer. The transmit antennas were on the outside of the gantry and were fed from the fixed reader via a Minicircuits splitter. The receive antenna was the center antenna. Polarisation of all antennas was horizontal.



The antennas were spaced at about 1 meter intervals and were angled at 45 degrees to the track. This gave the read distance up to 10 meters for motorcycles and 6 meters for athletes across the 4 meter wide track.



The fixed reader handles the multiple transponder decoding, providing a code within 1 millisecond of the code being read. The time must come from the computer software as the time the data arrives in the computer buffer.



The basis of performance is the Ecosportstag from Trolley Scan operating on 200uW of RF power. The tag is hermetically sealed inside laminated plastic sheets



Trolley Scan have shown in these tests that this equipment could be built into timing systems for use in sports timing. The success is primarily dependant on getting good transponder performance by the correct attachment of the transponder to the motorcycle/ athlete.