

# 2018

## The Use Of Transponders For Timing In Motorsport

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## Contents

|                                                            |   |
|------------------------------------------------------------|---|
| Introduction .....                                         | 2 |
| Motorsport Timing History .....                            | 2 |
| Development of Radio Frequency Identification (RFID) ..... | 3 |
| The Current Transponder Timing System .....                | 3 |
| Conclusion.....                                            | 5 |
| References .....                                           | 6 |

## Introduction

This report is going to be looking how motorsport has utilised RFID and transponder technology to improve the accuracy of race timing. To this it will look at the systems that were in use before RFID was introduced, how those how accurate those systems were, the manpower involved in running them and how they operated.

To understand how RFID came into use there will be a brief look at the history of the technology and why it was developed. This will be followed by a look at the current RFID system that is in place in Formula One mainly, but the systems for most motorsport are the same.

## Motorsport Timing History

Since there has been motorsport, there has been the need to accurately time the vehicles competing in these events. To understand how important modern-day timing systems are to motorsport, we must first look into the history of timing systems, how they functioned prior to modern technology and how accurate these systems were.

An example of an early timing system was in operation during the first seasons of the Indianapolis 500 event. This system used a wire that ran across the start finish line, suspended approximately one inch from the ground. This wire is connected to a trigger, that when triggered would make a stamp on a timing card. There would then be a team of timing and scoring workers who catalogue which vehicles made what marks. While this system would have been simple to operate, there are many factors that could cause inaccurate results. For example, the workers could record the wrong vehicle if there a two close together or the system could develop a fault such as wire snapping. It also required around one hundred and fifty people to operate.

These issues, along with advancements in technology led to the Indianapolis 500 developing the Flopper system. This was made up of a series of numbered plates that would flip over every second, essentially a large stopwatch. Each car would have a specific person allocated to monitoring when their car would cross the start/finish line and make a note of the time on the plates. These times would be recorded on a time card, from the bottom upwards so that the last lap could be deducted from the current lap to give accurate lap times. There would then be a team of four to five other people taking serial scopes, this is the process of monitoring and recording the order with which the cars cross the line to keep a record of race position.

The flopper system required far less manpower to operate than the wire and trigger, was less likely to fail in the way the way the trigger wire could and was more accurate it was still only accurate to the second. Meaning if two cars crossed the line within the same second it could be difficult to determine the lead car.

Formula One followed a similar set up until the 1970's when they started using a photoelectric timing gate. This system uses a beam of light across the start/finish line. A car breaks this beam as it crosses the line and the time is manually allocated to the car. Using a digital timer, it is able to record down to the tenth of a second making it more accurate than previous systems, it also requires far less manual input. However, this system is susceptible to manipulation. As proven by the March Formula One team in the mid seventies when a pit crew worker used their timing board (a board used to display the times to the driver) to disrupt the beam before their car crossed the line, giving a better qualifying time. (Pruitt, M – 2013)

## Development of Radio Frequency Identification (RFID)

Transponders were initially developed for use during World War II. The transponders were fitted to aircraft, with an interrogator fitted to radar devices. The interrogator would send out a signal that read the unique Identify Friend of Foe (IFF) code that the transponders send out. These codes were classified and unique to each aircraft. This system is still very much in use today on commercial airliners.

While the official timing system in Formula One for the early seventies was the previously mentioned photoelectric timing gate, Enzo Ferrari had signed a commercial deal with Jack Heuer in 1972 for Heuer to supply Ferrari with timing equipment. The deal was struck primarily for their La Mans twenty-four-hour race team, but it was also utilised by the Formula One team. The deal would see Ferrari using Heuer's Automatic Car Identification System (ACIT) Using a similar system to IFF, each car would be fitted with a transponder that sends out a signal to the receiver on the finish line. Since this was a digital system, it could be accurate up to one, one hundredth of a second (0.01)

By 1974 Heuer had become the official timing partner for Formula One, utilising his transponder system on all the cars. Since the 1980's when a company called AMP took over the timing Formula One the equipment has been made by MyLaps, but managed by different timing partners over the years. (Chalmers, D – 2014)

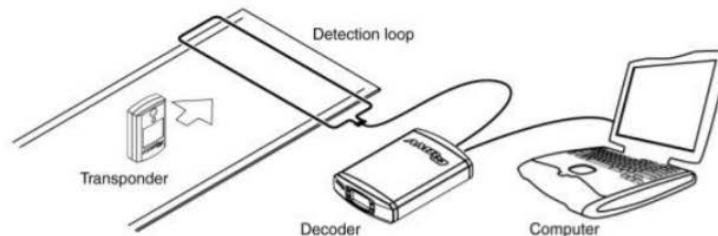
## The Current Transponder Timing System

The current system is made up of equipment made by a company called MyLaps, who specialise in RFID timing systems for all types of sport ranging from 100 metre running races right through to twenty-four endurance motor races. This equipment is usually managed by the Formula One timing partner, essentially a sponsor, currently Rolex.

Each car is fitted with two transponders that emit a unique code, this is picked up by receivers or interrogators, which are connected to a decoder that interprets the information and send it to computers to display the times. In most cases, the receiver is set under the track, at the start/finish line and at set sections of the course called intermediates.

## HOW DOES THE MYLAPS TIMING SYSTEM WORK?

The figure below shows the basic overview of an MYLAPS system, following a brief descriptions for each of the components



There are two types of RFID. An active transponder that transmits all the time, waiting to be picked up by a receiver. A passive system where the transponder is dormant until it passes by an interrogator which, as part of the interrogation process powers the transponder up, this is generally the type of transponder used for motorsport to prevent the possibility of other intermediate's interrogators picking the signal.

This system has many benefits. It requires far less manpower to operate as a majority of the process is automated, being able to measure time down to the nearest thousandth, it is far more accurate than previous systems used. With each car having it's own unique code, it is also easier than previous systems to reliably monitor each cars track position. (Dubendorf, V – 2003)

There are now some website that run live times, direct from events all over the world. A lot of these events are amateur events. This is great step forward for the profile of these events. It means that motorsport is now able to reach a wider audience.

The only major draw back to this system is that since it is all automated if any part of the technology fails it will have a huge impact on the rest of the system. To make sure it's all working fine at the start of the event each car's transponders are tested before the first practice sessions are started. Having said that, Transponder and RFID systems are extremely reliable. Which is why the uptake on their use has been quick and big. RFID is now in all major industries from retail to aerospace.

## Conclusion

After reviewing the information, it is apparent that the introduction of RFID and transponder technology has improved not only motorsport but all other timed sports. The improvements to sports are mostly centred around accuracy in timing. Taking motorsports as an example, having a system that is able to monitor multiple cars crossing the start/finish line at the same time and be able to separate them by the thousandth of a second.

The automation allows for real time updates on multiple cars during every stage of an event weekend from qualifying session to the main race event. With the growth of the internet and sites like <http://livetiming.tsl-timing.com/bsb> which broadcast live times made possible by RFID timing it has made motorsports much more accessible than ever before.

That so many other industries have taken RFID systems to suit their needs shows that this technology will be around for at least the foreseeable future.

## References

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