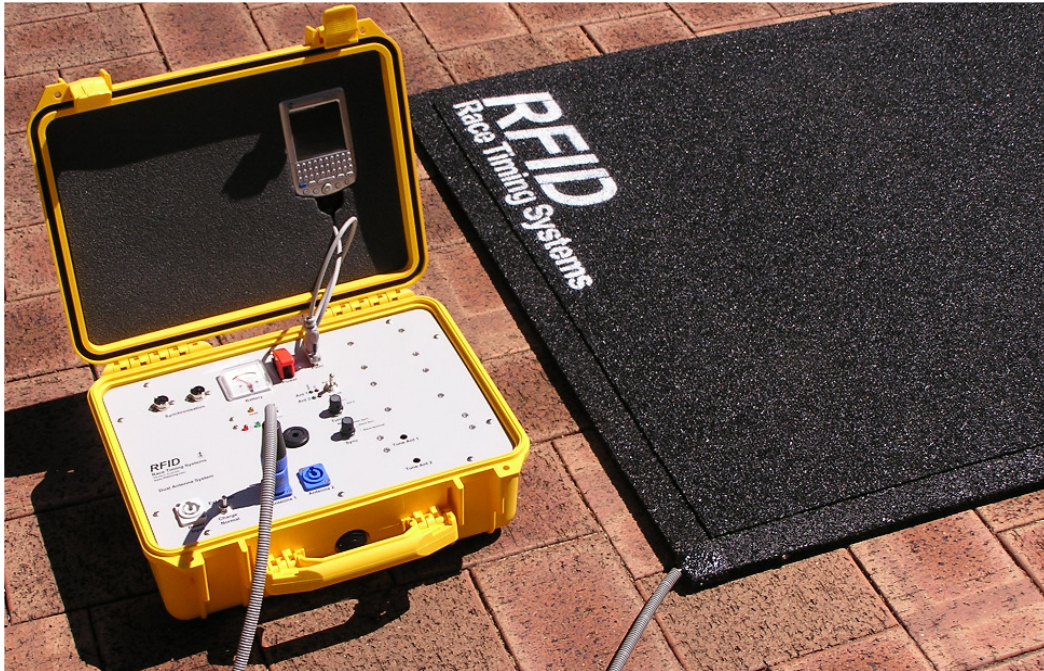


RFID

Race Timing Systems



RFID Race Timing Dual Antenna Mat System

Operating Manual

(2005)

Introduction

Congratulations on buying the most affordable and reliable timing system for small events. The acronym RFID stands for Radio Frequency Identification and is widely used in the electronics industry to describe the reading of tags or transponders using a radio frequency based communication protocol. This product should give many years of service if well maintained and transponders have an infinite lifespan since they contain no moving parts or batteries.

The RFID Race Timing System was developed specifically for smaller events that don't require the large antenna mat arrays used in more expensive systems developed by other companies. The Dual Antenna System uses two antennas to pick up competitors that are generally finishing in single file, or two abreast across the timing point. This is typical of most small running races and triathlons. The RFID Race Timing System has also been designed to be built upon by adding more Dual Antenna Systems. In this way, more than one Dual Antenna System can be synchronised to create a larger antenna array if required. The RFID Race Timing System comes with a 1 year warranty from the date of delivery.

How it Works

The RFID Race Timing System uses low frequency (134.2khz) radio signals to communicate between small coded transponders and an intelligent control module via a fixed antenna. This communication cycle is performed in 70 milliseconds so that there can be up to 14 read cycles per second. In a read cycle, the antennas are firstly charged with an electric current which produces a strong electromagnetic flux both above and to the side of the antenna mat. This electromagnetic energy is partially captured by a small antenna coil in the transponder. This powers a chip which sends its unique 16 digit code back to the antenna. The antenna then listens for 20 milliseconds so that it can receive the analogue signal from the transponder and decode it within the TIRIS control modules. Transponder codes are saved in memory on the control modules until interrogated by the Palm PDA via a RS422 serial network. The Palm PDA controls all commands of the TIRIS control modules and stores the data in a database on the PDA's RAM storage memory. Data can be uploaded to a timing program running on a PC computer for results analysis.

Important Rules

1. The instrument panel should only be removed by a trained RFID Race Timing technician. The internal components are sensitive to static electricity if touched and can be irreparably damaged. The panel should only be removed to replace the lead acid battery.
2. Never connect or remove any leads or plugs with the control box power already turned on. This may lead to permanent damage of the internal components. The correct procedure is to plug in all cables prior to switching the control box on.

3. Never operate the control box with the panel removed. There are high voltages within the components and these can cause injury.
4. Never allow water or dust to fall on the panel. The panel has holes which serve as ports for antenna tuning as well as allowing the units to cool. Never cover these holes or allow water/dust to penetrate. The control box can be operated in the rain as long as a good plastic cover is put over the unit. The control box is fully waterproof when closed.
5. Replace all damaged cables. High voltages pass through the antenna mat cables. Damaged communication cables (Palm and Synchronisation cables) will result in poor system performance.
6. If the ambient temperature surrounding the control box exceeds 30 °C, keep the control box in a shaded position. The internal components get quite hot after prolonged operation and can be damaged if operated in very hot environmental conditions. The internal control modules will shutdown if the temperature inside the control box exceeds 70 °C
7. Never use any screwdriver other than the one supplied for tuning antennas. The screwdriver MUST be made of plastic.

Basic Operation

1. Connect both antenna mat cables to the control box
2. Tune each antenna.
3. Turn off the control box power.
4. Connect the Palm cable to the control box and to the Palm
5. Set the synchronisation (attach synchronisation cables if necessary)
6. Turn on the control box power.
7. Turn on the Palm.
8. Open the Logger program set the correct preferences (including exact time) and start reading by selecting Open.

Parts List

- Control Box (yellow or orange plastic case)
- Antenna Mat (1.4m x 1m)
- Palm PDA (Tungsten C)
- Palm Hotsync USB cradle
- Palm 240 volt (AC) charger
- 12V Lead Acid Charger for control box (110/240V AC)
- Palm to Control Box cable(s)
- Synchronisation cable(s)
- Antenna Tuning Screwdriver
- Transponder Ankle Bands
- Installer Software
- Manuals

Additional Equipment (not supplied)

- Laptop Computer
- Wifi router
- LED display

Antennas Mats

Antennas mats are made from recycled rubber mixed with a urethane bonding agent. They have been designed to conform to the ground surface with no slipping even on smooth surfaces. It is important that mats are stored flat rather than tightly rolled because bending the mats at a tight angle will cause the rubber to crack. Be careful not to damage the antenna cables as these cannot be replaced easily since they are fully moulded into the mat structure. The antenna cables are protected by a plastic conduit that can be easily replaced. Please contact RFID Timing for replacement instructions. High voltages run along the antenna cables during normal operation so check for cable damage before use. The mats should be stored horizontally and can be placed on top of one another. Contact RFID Race Timing if the rubber is cracked. This can be easily repaired using a urethane bonder.

Antennas are plugged into the control box panel by finding the groove in the female connector, sliding in and then twisting clockwise until the plug engages. Do not force the plug if it will not twist. To remove the plug, pull up the metal tab with your thumb and twist anti-clockwise at the same time. Plugs should be kept free of moisture and dirt. Try to avoid dragging plugs along the tarmac as you position the mats.

Antennas can be placed side by side during operation. The maximum read range of the antenna is about 1.2 metres but most reads occur very close to the mat surface. If the foot with the ankle strap is placed on the mat, the time and tag number of the competitor will always be recorded. The slower the athlete crosses the mat, the more likely the tag number and time will be recorded.

The TIRIS RFID system that is used cannot handle tag collisions. A tag collision occurs when more than 1 transponder is in the same electromagnetic field of an antenna mat. However a read is often successful if one transponder is further away from the mat relative to another transponder. If competitors run across a mat in single file the natural distance between athletes should be enough to avoid tag collisions. Control of competitors at the timing point (and the orientation of antenna mats according to passing competitor traffic) will improve the read rate of competitors.

Antenna Tuning

The antennas should be tuned whenever the system is first installed at a site. Outside influences such as the proximity to metal may affect the inductance (and hence tuning) of each antenna. Each antenna has a slightly different inductance to each other. Tuning the antenna is very simple. Locate the special tuning screwdriver that was supplied with the system. This screwdriver is especially designed for this operation and must not be replaced by another type of screwdriver, especially metal screwdrivers. Metal screwdrivers must never be used as these interfere with the inductance of the ferrite screwing core. Metal objects should never be placed through the tuning holes as there are high voltages inside the control box.

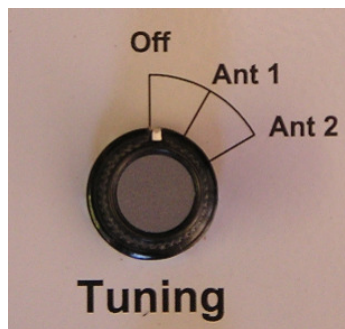


Fig 1. Control knob used to switch antenna tuning of each antenna



Fig 2. The antenna tuning indicator used to tune the antenna(s)

Switch on the control box power and turn the Tuning Switch to Ant 1 (Figure 1). The LED's on the antenna tuning indicator should light up (Figure 2). There are 4 LED's. The orange RXSS LED should be pulsing. Make sure the switch is set to Ant Tuning rather than Sync Level. The Sync Level setting is not used with this timing system. Three LED's marked In (red), OK (green) and Out (red) are used to tune the antenna. Carefully place the plastic tuning screwdriver into the appropriate tuning hole (Antenna 1 or 2) so that it engages with the top of the ferrite core (Figure 3). The ferrite core can be screwed when the screwdriver is properly engaged. This may take some practice. You may need to look through the hole with the aid of a torch to see where the screwdriver needs to engage the head of the ferrite core. You should be able to see the screw head of the ferrite core in outside daylight.

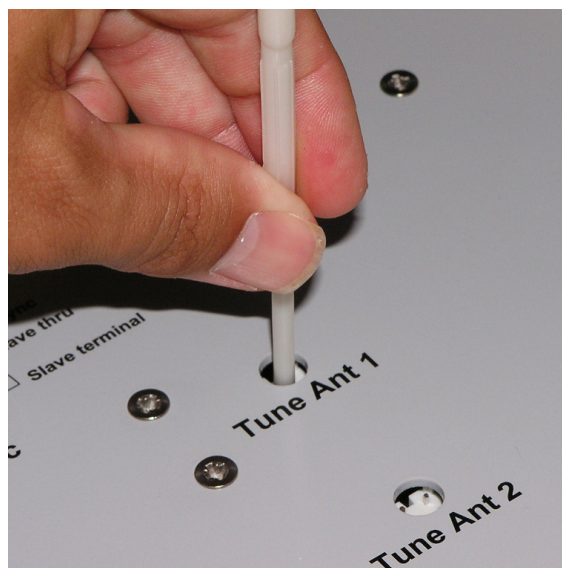


Fig 3. Tuning the antenna using the plastic screwdriver supplied with the system

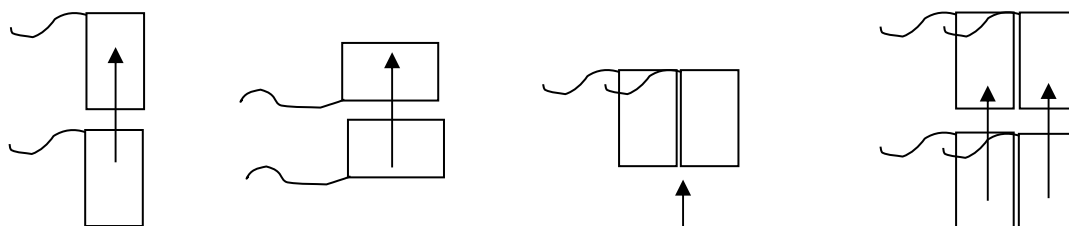
If the red LED is lit, turn the ferrite core in the direction indicated by the red LED. When the green OK LED is lit, the antenna is tuned for optimum resonance. Turn the Tuning Switch to Ant 2 and repeat the procedure for the next antenna.

Note: Tuning in the presence of metal: When trying to tune antennas over reinforced concrete or metal, you may not be able to tune the antenna. Continual screwing of the ferrite core will result in the core falling out of the plastic body and being lost within the inside of the control box. Do not overscrew the ferrite core. If the antenna cannot be tuned, try moving it to an area that does not contain metal. Antennas that are not tuned properly over reinforced concrete will still work but the read range will be significantly reduced.

Attention: There are high voltages generated within the control box during operation. NEVER remove the control box panel, especially during operation. Antenna tuning MUST be done with the supplied plastic screwdriver.

Antenna Mat Placement

The dual antenna mats are designed to be used in tandem so that the depth of the read zone is increased. Increasing the depth of the read zone improves the ability of the system to pick up every competitor. There is a trade off between read zone depth and finish line width. There are a number of ways the antenna mats can be arranged at the split point in the transition area (Figure 4).



- (1) (2) (3) (4)

- (1) Narrow chute, maximum probability of reading athlete.
(2) Wide chute, next best probability of reading athlete.
(3) 2 metre wide chute able to handle two finishers at one time. **Recommended.**
(4) Using two control boxes.. Control boxes must be synchronised. Can handle two finishers at one time and has backup line. **The Best.**

Fig. 4. Various methods of deploying antenna mats. The arrow indicates the direction of competitor travel.

For most events like triathlon and duathlon, the mat placement shown in (3) is the ideal. It has a reasonable finish chute width (2.0 metres) and it is almost impossible for athletes to not be detected. If using (1) or (2) it is best to use antenna 1 as the first mat to be encountered by the athlete. This is because antenna 1 has a slightly better read rate than antenna 2 because antenna 1 is driven by the master unit within the control box.

The possibility of not recording a competitor is decreased if athletes are told that their foot with the ankle transponder band must be placed on the mat. Athletes that jump over the mats may not be recorded although this is almost impossible with a + 2m read zone. Athletes can also be told to listen for the audible beep that represents a positive read. As athletes become familiar with the system you will notice that they will consciously try to place their foot in the correct position to maximise a read. Experimentation may be required to find the best setup.

Control Box

Batteries

The battery used in the control box is a 12V, 17 Amp/hour sealed lead acid battery. The battery should give years of good service if it is fully charged every time it is used. The battery should last for 5 hours of continuous use in read mode with two antennas in operation. The control box will still operate even though the battery is quite low (less than 11.5 V). However drawing power from a discharged battery will reduce its lifespan.

LED's

The control box has 4 LED's on the front panel marked Ant 1 and 2 and Read and OK (Figure 5). There are two sets of LED's for each antenna. The red LED is marked On and signifies that the reader units are powered up and cycling ready to read transponders. These LED's will not light until the readers have been instructed to cycle by the Palm computer.

The green LED's signify a correct read of a transponder by the respective antenna. No transponder ID will be recorded without the green LED being lit.

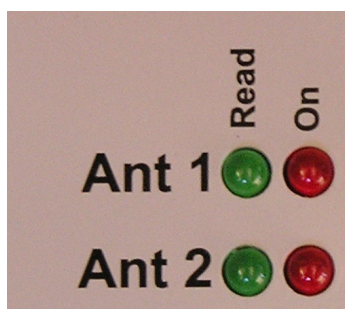


Fig 5. Readout LED's showing status of each antenna

Battery Charging

The internal lead acid battery is charged by the 12V charger supplied. The charger is the latest fast charge/float charge design and will charge a fully discharged battery in 12 hours. Make sure the control box power switch is switched to Charge during charging. The battery charger can be left on indefinitely since the charger will alter the charge voltage once the battery is fully charged (float charge). Only use the charger supplied as other chargers could damage the battery. Chargers can be purchased from RFID Race Timing or we can direct you to an alternative.

External Power

Flicking the switch to External Power allows you to power the Control Box with an external power source. It is important that the power source is approved by RFID Race Timing since some power supplies can interfere with, or damage the sensitive internal electronics. External Power may be used for events that require continuous reading of transponders over longer periods than 5 hours.

Voltage Meter

This reads the status of the internal lead acid battery when the control box is switched on. The battery voltage should not go into the red zone. Batteries should always be charged after use and never fully drain the batteries. The voltmeter display indicates that the control box components are powered up and that the battery is sufficiently charged for use. It is OK for a battery to be used when it is in the yellow zone.

Audible Buzzer

A beeping sound is emitted after a successful read. This is often used to test the system or to acknowledge athletes that their time has been registered. The buzzer can be switched off for silent operation if required.

Synchronisation

When several control boxes are in read mode at the same time, each control box must be synchronised with each other using a synchronisation cable. The synchronisation cable is a grey cable with 5 Pin DIN plugs at each end. These plugs engage into either of the synchronisation DIN sockets shown in Figure 6. Look to see where the plug

should engage the socket and push the plug into the socket. The plug has a locking ring at the end which should be twisted to stop the plug from being accidentally knocked out.

Each control box sends a 50ms charge up pulse followed by a 20ms read period. These two events cycle continually whilst in the read mode. When the read cycle of a control box is not synchronised with another, there will be problems with reading transponders as one unit tries to read transponders whilst another charges them. This conflict is resolved when using synchronisation and allows one control box to be the master and the others slaves. The read cycles are all synchronised by the master control box.

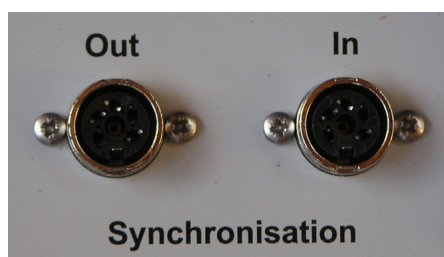


Fig 6. Din sockets used to route the synchronisation signal to other control boxes.

Synchronisation needs to be used if the control boxes are used simultaneously within 70 metres of each other. This distance can be more or less depending on the surrounding environment. Metal structures like barriers can increase the distance that units need to be separated if synchronisation is not used. It is good practice to use synchronisation most times when more than one control box is being used (read cycle) at the same time in the transition area. Remember however that if the master control box is switched off (i.e. the red LED indicator is not on), then all connected slave control boxes will not be able to read transponders. The synchronisation signal from the master always drives the master units. For this reason, make sure that the synchronisation cannot be tripped over or damaged during the event. There is no limit to the length of a synchronisation cable. They are inexpensive and can be routed around the transition area.

The setup for synchronisation is to use one control box as a master and the others as slaves. This configuration needs to be also set by the Palm Logger software and by the Synchronisation control found on the front panel of the Control Box (Figure 7). The default setup is to configure all control boxes as masters when synchronisation is not used. Please refer to the Palm Software section about using Logger to configure Synchronisation.

A further synchronisation setting is available in the Logger preferences. This is a Wireless setting which will enable multiple control boxes in the same vicinity to synchronise wirelessly. However, only 1 antenna may be used on the setting (Antenna 1).

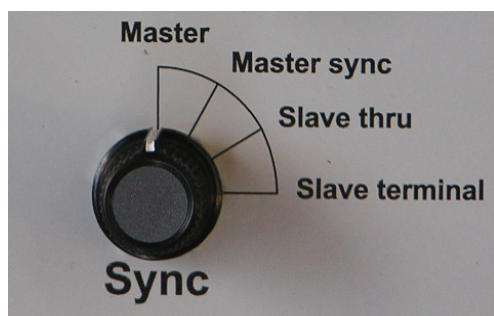


Fig 7. Switch settings for Master, Master Sync, Slave (thru) and Slave (terminate)

Table 1. The settings needed for correct setup of synchronisation

Control Box	No. of Control Boxes	Palm setting	Cables
Master	1	master	None
Master (sync)	2+	master	Out only
Slave (thru)	3+	slave	In and Out
Slave (terminate)	2+	slave	In only

To determine whether synchronisation is needed, the timing system should be set up and tested in the transition. Try reading transponder bands at the same time on each control box and observe the green LED light. If the light only comes on intermittently, or the Palm does not display the tag number immediately then synchronisation will need to be employed. You will also experience poor read range from the antennas when there is interference from other control boxes.

Note: If you have set a control box as a slave with the Logger program this will remain the setting for the control box even after power down. It is a common mistake to forget to set the control box back to a Master through the Logger Preferences. Trying to run a control box that is set as a Slave without using synchronisation will result in no transponder reads.

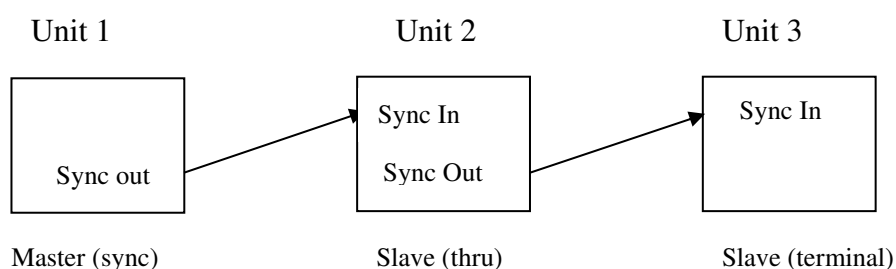


Fig 8. Diagram showing a 'daisy chain' of 3 synchronised Control Boxes

Palm

The Palm is networked to the control box and records the tag numbers and time as competitors cross the mats. The Logger program (RFID Timing) is used for this purpose and must be installed on the Palm. See the Palm Software section for more details.

The Palm connects to the control box using a short communication cable supplied. The D9 pin serial style plug connects to the control box. The plug should be secured to the male connector port using the tightening screws on the cable plug end. The 16 pin Palm connector is pushed gently into the Palm communications port found on the bottom of the Palm. The connector is guided by two holes and engages with gentle pressure. **Never force the connector as it can be easily damaged.** To release the connector from the Palm, press down firmly on the button on the upside of the connector plug and the plug should spring release. The connector is similar to many mobile phone connectors.

When the control box power is switched on, the Palm On/Off button on the top right will be lit green. The Palm will show the charging symbol in the top left hand corner of the screen. The Palm is charged from the control box when the control box is switched on. The Palm comes with its own AC 110/240V charger that connects to the Hotsync cradle and should be used to charge the Palm's internal lithium battery when the Palm is not in use.

Data is stored safely on the Palm. All tag numbers and times are continually saved to the Palm's Random Access Memory (RAM). The RAM is only lost if the Palm battery is fully discharged. The RAM will remain intact for a small time even after the Palm will not turn on when the battery is fully run down. The Palm's internal battery cannot be fully discharged when connected to a powered up control box. Data is also saved on the host PC computer during a Hotsync. For more details on the Palm PDA hardware, please read the supplied Palm manuals.

Transponder Ankle Bands

The RFID Race Timing System uses TIRIS 32mm glass read only transponders housed in plastic housing. They can withstand any temperatures that a human can withstand and can be fully immersed in salt water. The transponders housing can be threaded onto a shoelace or onto the supplied neoprene band. Housings are numbered according to their programmed transponder number. The band numbers are used to identify each competitor and generally correlate to the race number for each entrant given by the race organiser.

The band is fixed to the ankle with the soft neoprene strips on the inside. The neoprene prevents chaffing whilst the athlete is in competition. Do not put the straps on too tight as the ankle can swell during competition. The RFID Race Timing System transponder bands have been thoroughly tested in many events and will give many years of service if looked after. They can be washed in a washing machine if dirty. Lost or damaged bands can be replaced by RFID Race Timing. Please quote the

missing transponder bands number when lodging a request for a replacement. When transponders are replaced you will need to load an updated Transponders.pdb file to the Palm's. This file will be sent to you with the new replacement bands and it is a simple process of installing this file on each Palm.

Software

Palm Software V2.0 for Dual Antenna System (pre-Installed with System)

Installation

The following steps should be followed to fully install the RFID Race Timing System

1. Install the Palm proprietary software supplied with the Palm documentation. This will install the Palm Desktop utilities such as Hotsync Manager and Install Tool which are needed for Palm to PC synchronisation of files.
2. Open the RFID Race Timing install CD and double click on RFID Race Timing Installer.exe to install all the remaining components. This will create a folder in **C:\Program Files** called RFID Race Timing. A shortcut will also be added to the RFID Race Timing PC program used to prepare entries and results.
3. Open the folder **C:\Program Files\RFID Race Timing\Palm RFID** Install and double click on **PalmCOMInstaller.exe**. This will load important DLL's for the Palm to PC conduit. Next double click on **RFID Installer.exe** to install the Logger conduit.
4. If the Logger conduit has been successfully installed, connect the Palm cradle to the computer with the Palm in the cradle and press the Hotsync button. This will install the **Logger.prc** and **Transponders.pdb** files to the Palm. If you have more than one Palm, just place each Palm into the cradle and press the Hotsync button to install these two files on each Palm.

Installation of all software should now be complete.

Logger 2.0 (Palm)



The Logger program communicates with the control box hardware to record transponder numbers, keep accurate time and save database fields in a file that can be sent to a PC by Hotsync.

The Logger program is very simple to use. You should be familiar with the use of the Palm stylus and the interface of the Palm PDA. See the Palm documentation supplied for further information on Palm hardware and software settings/usage.

Logger

Open Logger and the first window to appear will be the main screen. This window is used to start the read cycle of the Control Box by selecting the Open button on the screen. When a transponder is read by the Control Box, the tag number and time are

displayed on the screen. Details from the next transponder read will be shown at the top of the screen and past data will scroll downwards. There is also a counter showing how many records have been read. Whenever the Open button is pressed, a database is opened or created to store the captured Logger data. If you press Open and a database file already exists with the same name, you will be prompted to either Append or Overwrite the existing database. Select Append to add data to the existing data.

There is no need to save or open files. All the data is recorded on the Palm automatically under a file name that is decided by the date and the split being recorded.

Files

Files are saved with the following format;

Xddmmyyyy

Where;

X = the split being timed

S = Swim

B = Bike

R = Run

O = Other

dd = day

mm = month

yyyy = year

For example, after recording the bike split of a triathlon on May 10, 2002, the Palm text file will have the name;

B10 52002

Files are transferred during a Hotsync with the host PC computer. A Palm cradle or USB cable (supplied) are used to Hotsync the files (see Palm documentation). The files are sent to their repository directories with the path c:\Palm\palmname\RFID\ where *palm name* is the name given to each Palm when the Palm is first setup for a Hotsync (see Palm documentation).

Logger files are saved as comma separated text values and can be imported directly into Excel or a similar spreadsheet program. The files are also designed to be uploaded into the RFID Race Timing PC software supplied with this system. See the section on the RFID Race Timing software.

Preferences

Split

This window determines the name of the Logger file by choosing the split to be recorded (ie. swim, run etc.). Click on the Leg Button under Split to select a leg to time. The leg is recorded in the preferences file and your selection will remain with the Logger program even after turning the Palm off.

Synchronisation

The synchronisation status of each Control Box needs to be programmed before it can be used. When the Logger program is opened, it sends a command to the Control Box to set it as a Master (default). If the Control Box is not turned on when the Logger program is opened, this command will not reach the Control Box and it may still be configured as a Slave. For this reason, it is good practice to select the correct synchronisation status of the Control Box by selecting the Sync button so that the Master/No Sync or Slave options can be chosen. When a Control Box is synchronised with a another Control Box that is setup as the Master, then this Control Box should be set to Slave using the Preferences in the Logger program. This is the same whether it is a Slave Thru or Slave Terminal Control Box (see Synchronisation).

THE CONTROL BOX MUST BE POWERED DOWN AND THEN TURNED ON AGAIN FOR THE CHANGES IN SYNCHRONISATION TO TAKE PLACE. The Palm and Logger program should be left open during this power down/ power up phase.

Number of Antennas

The number of antennas to be used can be changed from 1 to 2. In most cases, 2 antennas should be used to fully maximise the reading capability of the dual antenna system. However, in some instances (ie. checking off transponder numbers and diagnostics) you may only want to use one antenna. Antenna 1 will always be on and choosing 1 antenna will turn off Antenna 2.

File Saving

This preference allows the user to determine the way transponder tag numbers are recorded by the Palm. By selecting "Allow multiple reads", when a tag number is read, it will only be recorded once for the given split. This should be used when the Control Box is used to time only timing point only. If the box is not ticked, then holding a transponder over the antenna mats will result in multiple recording of the same transponder tag number in the Palm file. This would be used if multiple splits are to be recorded by the one dual antenna system. For example, the unit may be time both swim and bike entrance points and be left on throughout the race. There will be two sets of times for each competitor as they cross the mats for their swim and bike splits. The RFID Race Timing program can be used to separate these splits into their respective legs (ie swim and bike split times). The two antennas can also be separated to each time a specific leg. For example, Antenna 1 may be used for the swim leg and Antenna 2 may be used for the bike leg. The distance between mats will be limited by the antenna mat extension cables. Again, the RFID Race Timing program can be used to differentiate splits on antenna number (1 or 2 for dual antenna systems).

Set Time

It is very important that the correct time of the Palm is set prior to the race start. Press this button to alter the Palm's internal time and adjust the hours, minutes and seconds using the arrows. It is best to use an accurate digital watch to determine the time of day and set each Palm to this same time. It is also very important to record the actual start times of each race according to this time of day. The start times will be used to calculate race splits and net time when preparing results using the RFID Race Timing program.

It is also important to set the correct date on the Palm via the Prefs so that the correct date is recorded in the database filename. A wrong date will make it difficult to find which database file belongs to a particular race and timed leg.

Files

To view existing database files, select this option from the left hand drop down menu. Periodically from time to time, files should be removed from the Palm when they are no longer of use. To delete a database file, select it from the list and press the Delete button.

RFID Race Timing

Introduction

This software has been designed to make race entry and result reporting easy whilst providing some basic formatting options. The software is designed to handle multisplits as are found in triathlons and other multisport events. Race entry is simplified by utilising a Microsoft Access database of past and present entrants/members to enter in athletes for a given event. The program uses this database to choose the correct age category for entrants based on the known age of competitors which is stored in the Access database.

Files are uploaded into a completed competitor race file from the Palm directory on the PC (C:\Palm\.....) and net split times are then calculated. The results table can be directly exported to Excel or saved as a comma separated file for access by a 3rd party spreadsheet or database program.

Procedures

Starting a new race file

Click the **New File** icon on the top toolbar to open a new race file. A race file is needed for an event or race. You may sometimes want to work on two different race files when the categories for two different sets of events differ. For example, a short course triathlon may have different categories to a long course triathlon yet the races are run together on the day. In the case, you should create two new race files.

Opening an existing race file

Click the **Open File** icon on the top toolbar to open an existing race file. You may open an existing race file at any stage. When a race file is opened, all changes are saved immediately on editing so there is no need for saving or closing race files. If you open an existing race file, any file that was currently open will be closed.

Entering race entrants

Competitors are added by inputting the surname, name and sex of each race entrant. If you have an **Existing Member Database**, you will notice that once you type in the surname, the closest available surname of people in the members database will be selected. The first names of these members will also appear. To select the first name, click on the name of choice if there is more than one first name for a given surname. If there is only one first name shown, the other text boxes will be populated with the correct data. If the competitor does not exist in the **Existing Member Database**, it is important to enter the sex (M or F) into the **Sex** text box. When a surname, first name and sex have been chosen, you will be able to **Add Competitor** to the race file.

Before adding the competitor, you should choose the **Event Type** and then the **Category** from the drop down lists. The list of available categories is determined by the age and sex inputs.

The **Event Type** is determined from the **Category Database** and can be modified and developed via the **Category Editor**.

For Asian names or team names, you may only want to add one name (surname) and no first name. Go to **Preferences** (under menu **Functions**) to click 'do not use first name'.

Category Editor

The **Category Editor** is used to add categories and events so that they are available as drop down menus when entering race entrants. The **Category Editor** is opened by selecting it from the drop down menu under **Functions**. Any additions or changes made to the data in the **Category Editor** are made straight after editing so there is no need to save.

All fields are mandatory except for the category letter which is optional. It is important to add each category available in the race (both male and female) with the correct age range. The age range will determine what categories appear in the **Categories** drop down list on the main race entry page. You may delete rows by clicking on the far left of each column to highlight a row and then press delete. Examples of events and categories come with the installed software. You may delete these and put in your own events and categories.

Adding Race Numbers

Race numbers correspond to the numbers printed on the transponder ankle. Prior to race registration, the race numbers must be allocated to each competitor. If race numbers have already been allocated (green boxed message), then you will be prompted to verify that you want to re-allocate race numbers. It is important not to re-allocate numbers once transponder timing bands have been handed to competitors.

There is also an option to use another race number that may have been allocated by the race director. This option is accessed under **Functions...Preferences**. This second number is called an External Number and can be entered when entering competitors.

Once you click OK to add race numbers, a box appears with options for making external number automatically the same as race number, and for the numbering to start from a particular number. For example, you may want to allocate all entrants of a particular event to race numbers greater than 200. You then add 200 into the box alongside 'Start numbering from'.

Start Times

Before results can be calculated, the start times for each category must be added. Clicking Start Times from the top toolbar will open a new window with 6 lists corresponding to up to 6 wave starts. Select each category in the list and then enter in the start time for this wave at the bottom. Continue this for each wave start until all the categories have been selected in their respective wave start. Click finished to add these start times to the race file.

Palm Files

Clicking on Palm Files on the top toolbar will open a new window which enables you to upload the raw Palm Files into the race file. Palm files are stored in a special directory on the PC computer after a Hotsync is performed between PC and Palm. The Palm files are stored in the folder RFID which is situated in one or more directories relating to each unique Palm. The name of this directory (found in c:\Palm) is determined by the name of the Palm that is synchronised. The Hotsync Manager creates a new directory for each Palm after the first Hotsync operation. The Hotsync Manager allocates the directory name automatically (ie Palm Tungsten T 1).

The Palm files are simple comma delimited text files that contain the raw data saved by the Palm during a timing run. The following data is saved in each row of comma separated values; antenna number, transponder ID number, race number and time of day.

Uploading Palm files associated with one timing point

In most cases, the control box and Palm are used to time one leg of an event (ie. swim entrance). In this case, the Palm file will only contain splits for one leg. The Palm file may contain multiple times for the same race number but only the first time will be used as the actual split time.

Enter whatever name you like to call the split in the top input box. This name will have "_split" appended to it as the column's name.

Click upload to load the Palm File. The default directory is c:\Palm. Open up the folder corresponding to the actual Palm machine that contains the generated Palm file and then click on the RFID folder where all the Palm files are situated.

To add another split time from a different Palm file, repeat the procedure above by entering a new split name and clicking upload. When you are finished, click Finished to see the race file with all the times for each competitor. Please note at this point, the times are the actual time of day and not the net split times for each leg.

Uploading Palm files that contain more than one split (Multisplits)

In some cases, one control box may be used to time two or more splits during a race without changing the filename of the Palm database file. An example would be a triathlon where the control box is used to time the swim bike and run at the same point without turning off the Palm and changing the leg name. This may be necessary if some competitors are finishing the bike whilst others are finishing the run (overlap). The RFID Race Timing software enables the user to differentiate these splits from the one file. This is done by filtering the times recorded for each competitor. An erroneous time will be determined for a competitor if an early split is not recorded. For example, one competitor may not be recorded for their swim split but will be recorded for the bike and run. The RFID Race Timing software will expect the first split to be the swim despite this split missing from the Palm file.

Before uploading **Multisplits** to the race file you must go to Preferences and click the multisplits option. Once this option is selected, add splits by typing in a new split name and then uploading the Palm file. Continue this procedure until all splits are loaded making sure that you enter a new split name each time and uploading the same Palm file.

Multisplits can be calculated from a Palm file if each antenna is used to time a different split. For example, antenna 1 may be used to time the swim whilst antenna 2 may be used to time the exit to the transition at the same time. By going into **Preferences** and selecting, "Differentiate on antenna number", you can separate the two splits when uploading the same race file. The first split will always be antenna 1 and a new split name will need to be typed in so that the second split can be uploaded from data recorded by antenna 2.

Note: If you set up both antennas to record two different splits, it is important that the antennas are separated by at least 2 metres. Otherwise a transponder may be read on both antennas since the receive fields of each antenna may overlap.

Whenever the **Palm Files** window is opened and the Palm Files are added, any existing splits will be removed prior to adding new splits. This means that all splits need to be added to the race file in one go.

Laps can also be calculated instead of times. This may be useful for multilap races over a given period of time. Go to **Preferences** and select **Laps** to enable this feature when uploading Palm files.

Calculating Splits

Once the recorded time of day for each split has been added to the race file, the **Calculate Splits** function (top left on toolbar) is used to calculate the net times for each leg and also the finish times and category placing's.

Printing

A simple printout can be created of the race file. There is an option to just print out a registration sheet or the complete results. Often, it is better to export the results to Excel and print from this program since there are more formatting options with Excel.

Exporting Race Files

A direct copy of the race file can be exported to either Microsoft Excel or as a comma separated text file. When exporting to Excel, the Excel program is automatically opened and a spreadsheet is populated with the race file data.

Sorting Data

Sorting of race file data can be done in ascending order on up to 4 fields. Go to Functions....Sort after highlighting the column you want to be sorted on. Data is not affected, only the display of the data.

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