

# ControlOPrecision (Trail-O Management)



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## Introduction

Trail-O event management system. It uses a database to store all the data necessary for the management of events (events, clubs, categories, question-answers, timed controls, participants); the system contains the logic to perform the basic management of these data, the complex management of checking of answers and calculation of results, as well as the visualization of these results in the form of classification.

The system accepts a response checking management manually, semiautomatically and / or automatically.

The manual mode consists of writing the answers given by a participant in a paper control card.

The semiautomatic mode consists of the combination of the above with the possibility of scanning the results card to make an automatic recognition of responses and a transfer controlled by the operator of the system.

The automatic mode consists in the use of the Sportident system for the management of all the aspects related to the control of the answers provided by the participants. It must be said that the Sportident system can also be used partially, only to keep track of race time.

The program has multi-language support and several languages have been configured (Galician language, Spanish, English and French)

The program has multi-platform support, having been tested in Windows 7, Windows 10 and Linux Ubuntu.

## State of the Project

It's a program made in the Java language. It should be noted that nowadays it's not a product. There are many hours of altruistic work so it has not been possible to reach a state of maturity that makes it a robust and efficient system. It does what it does and, working in the manner specified in this manual, it should not give any problem.

Successfully tested in several events:

- 2016 Trail-O Spanish Championship. Manual control of answers. Control of times (Start time, finish time) with Sportident, only for pCard
- I Trail-O Open, 2017, in Galicia, Arteixo (A Coruña). Full management with Sportident, only for pCard. Only normal controls, no timed controls
- II Trail-O Open, 2017, in Galicia, Lugo. Full management with Sportident, each participant with his card (Si5, Si6, Si8, Si9, Si10, Si11, SIAC & pCard). Normal controls, one timed control
- III Trail-O Open, 2017, in Galicia, Pontevedra. Full management with Sportident. Tempo variation, no normal controls and 4 groups of 3 timed controls
- IV Trail-O Open, 2017, in Galicia, Xinzo de Limia. Full management with Sportident. Normal controls and one group of 3 timed controls
- 2018 Trail-O Spanish Championship, Albacete. Full management with Sportident. Normal controls and one group of 3 timed controls
- 2018 Trail-O Galician Championship, Corunna. Full management with Sportident. Normal controls and one group of 3 timed controls
- 2019 Trail-O Galician Championship, Corunna. Full management with Sportident. Normal controls and one group of 3 timed controls
- I event of 2021 I Trail-O Galician League, Xermade (Lugo). Tempo, 6 stations. Full management with ANT, sending all data to the management software
- II event of 2021 I Trail-O Galician League, Corunna. Normal controls and one group of 3 timed controls. Sportident for racing time. ANT for timed controls and ANT to transcribe participants answers, sending all data to the management software
- II event of 2022 II Trail-O Galician League, Goente (Corunna). Full management with Sportident. Normal controls and one group of 3 timed controls

- III event of 2022 II Trail-O Galician League, Castro de Viladonga, Castro de Rei (Lugo). Sprint format. A-Z Controls. Sportident for racing time. Answers in paper and manual transcription. 1 fictitious timed group to count the race time, as it is a tiebreaker criterion when equal points.

Modifications since the tenth revision:

- Minor changes related to the values of certain fields and FTP upload to servers with TLS/SSL security
- Creation of an application installer. Starting the versioning, v.1.0.0

Modifications since the ninth revision:

- Stores event files in a specific folder for each event, within the DocsEventos folder (logos for reports, results, configuration xml, card reading log)
- In the controls that share stations, correctly compute the responses even if the participant forgets to mark first at the selection station. The sequence that everyone should follow is: selection, response, selection, response, ... The change allows a good evaluation of the sequence: response, selection, response, ...

Modifications since the eighth revision:

- Forms. Stores position and size, as well as checkbox status. Reopening the form uses that stored data
- Participants. Fields Rent Card and Not Classify, for rented card notice and results with out-of-classification information
- Categories. Duplicate a category to create a new one with the same definition of responses and timed controls
- Listings. Participants still in the race and participants who did not start

Modifications since the seventh revision:

- ANT update, v.4.9, requires modifying the way the data is processed. Also, DB modification for future web management of events

Modifications since the sixth revision:

- Integration of results from ANT (<http://www.trailo.cz/en/software>)

Modifications since the fifth revision:

- Generation of graphism for overlapping on screen

Modifications since the fourth revision:

- Extension in order to use neutralizations

Modifications since the third revision:

- Improvements in the visualization/generation of results:
  - o Generation of tickets directly in receipt printers. Successfully tested in some Epson termal printers (TM-T88IV, TM-T70). Generation of TXT file to print from notepad is still there
  - o Printing the results list from the button "Print" with success
  - o When showing the full report including correct answers, a color is added to indicate the mistakes made. There is also an statistic at the bottom of each class with the percentage of correct answers in each control (normal and timed ones)
  - o Possibility of adding 2 logos at the top of the results. Files: LogoL.png (left side) and LogoR.png (right side). In case of existing they are added. If not the report only shows the event description
  - o Possibility of adding a memory dump from the SiCard when creating the results ticket, in order to let the competitor see all of the saved punches

Modifications since the second revision:

- Extension for use of remote servers in several aspects:

- Local / remote connection to the DB (TCP server). Allows concurrent use from several computers
- Sending results (FTP server). Performs the automatic upload of the results file by FTP
- Download of punches in intermediate points (CPI server). If the sending of punches in intermediate points is used, these punches are stored in a server; the program can be connected to the server, download the punches and allow the visualization of results at the finish line or at the intermediate points
- Upload of punches (Punch server). Independent form for the readout of Sportident cards and upload of the punches to the intermediate points server
- Adaptation of the method to manage Sportident to accommodate a variant in the timed controls. This method consists on: timing first, then marking the answers. This eliminates possible reluctance due to the effect of wasting time when responding with Sportident.

#### Modifications since the first revision:

- Multiplatform operation. Although Java is a language not oriented to a specific platform, third-party libraries were used in some parts that do. Some aspects exclusive to Windows have been replaced or adapted, so now it works also in Linux (tested with Ubuntu). These are: scanning of documents, serial port communication
- Added a menu option to change the language manually
- Parametrizable format of realization of a time group. It allows the use of the FEDO (Spanish Orienteering Federation) way of acting, with an overall time limit for all the controls of a group and a penalty for failed or not answered control. Now, it's possible to define the realization of groups with start & stop for each control and even for Tempo
- Improvements in Sportident management so that the same stations can be used in all the controls of the same timed group
- Error control improvements

#### To do list for the future:

- Complete event web management, not only for a real event but also for online events or mixed ones.
- Robust error control. The data fields that are handled in the forms expect values within specific domains and ranges (numbers where numbers are expected, etc.). Error checking while writing data is basic in any product, but it takes a long time to program, so by now don't write aberrant data in the expected fields and the system will continue to work correctly.
- Speed up some operations. Improve the reading procedure of Sportident cards.

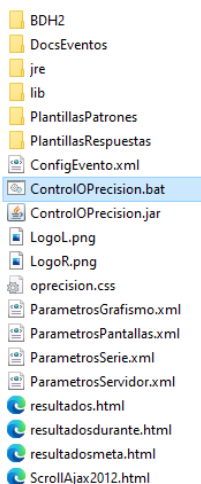
## System architecture

The system is developed in Java and therefore has a series of libraries that allow the management of most of the needs (basically divided into data management, program logic and user interface). Other third-party libraries are also used for specific aspects (DB management, document scanning, serial port communication)

A Java Runtime Environment (JRE) is provided to ensure correct operation regardless of the Java version installed on the user's computer. However, the program folders already have all the necessary libraries, so this extra storage space due to the occupation of the JRE (approximately 160MB) would not need to be spent.

The system is installed in a set of folders and subfolders that contain the libraries, configuration files and files that represent the database. A relational database is used to manage the data and XML files for the configuration. The architecture of the system is performed so that a variety of relational database management systems could be chosen, provided that they have a Java library for their management (JDBC drivers). Initially MySQL was chosen, but later it was changed to a very simple DBMS that does not require installation on the operator's computer (BDH2)

The typical operation of the system is single-user, that is, installed and managed from a single computer. The installation is done simply by copying / pasting the folders somewhere on the computer. However, since revision 3, remote access can be configured for concurrent use by several users.



The image shows the structure of folders and main files:

- BDH2. Database files folder
- DocsEventos. Folder to store files from each event. It has a subfolder for each event
- jre. Java Runtime files
- lib. My own and third-party java libraries
- PlantillasPatrones and PlantillasRespuestas. These 2 folders store the definition of the templates for the manual answers and the scanned documents related to the answers given by the participants, respectively. Both one and the other contain a subfolder for each event managed over time
- ConfigEvento.xml. Active event configuration parameters
- ControlOPrecision.bat. Application launcher (Windows)
- ControlOPrecision.jar. Application main library
- ControlOPrecision\_LecturaSi.bat. Launcher for the module that is in charge of downloading punches at intermediate control points and sending them to the server
- ServidorArranca.bat. Launcher needed for the database to be started in server mode. Not used for standalone mode

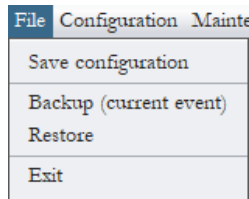
- ServidorPara.bat. Launcher needed for the database to be stopped from server mode. Not used for standalone mode
- **FILES MOVED** to the DocsEventos folder:
  - o LogoL.png, LogoR.png. 2 image files to add logos at the left and right side of the results header.
  - o oprecision.css. Cascade Style Sheet for the html results file
  - o ParametrosGrafismo.xml. Graphism form configuration parameters (real time results to be shown on a second screen or sent over Internet)
  - o ParametrosPantallas.xml. Stores position and size of the forms, as well as some checkboxes
  - o ParametrosSerie.xml. Serial port configuration parameters
  - o ParametrosServidor.xml. Remote servers configuration data
  - o LogSiCard.txt. Log file containing the readings of the Sportident cards
  - o resultados.html. Results file that can be periodically built by the application. The goal is to show the results on a separate screen or projection
  - o ScrollAjax2012.html. File that load the results html file and performs an automatic scroll if the full contents don't fit the screen
  - o ticket.html. Particular results of a participant. The goal is to be printed and given to each participant right after the readout process
  - o ticket.txt. The same as the previous file, but in the form of a text file. Actually there is a problem printing the ticket on a termal receipt printer, so this file is generated to be manually sent to that kind of printer from the notepad application, for example

## Operation logic

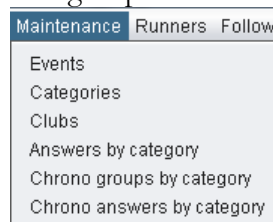
The system is managed through a single entry point that launches a main window that has a menu with all the necessary options.

The menus are used to classify the sequence of steps to follow in the preparation and follow-up of an event.

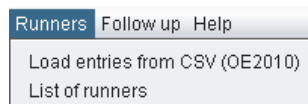
Configuration phase. The file and configuration menus contain some options that allow parameterizing the application. The file menu allows you to save the configuration file, make and restore an event backup and exit the application. The configuration menu allows the selection the active event, the configuration of the serial communications port to which the Sportident readout station connects, the transcription of the design of the paper card used in each event, the configuration to access the different remote servers and also the configuration of the graphism generation for provisional results



Event's preparation phase. You can create an event, categories and clubs. Related to the courses belonging to each category, you can register the correct questions-answers, the groups of timed controls and the controls that belong to each group with their answers.



Also as part of the preparation of an event, the other menu allows you to manage the participants. Participants can register and edit manually through a specific screen, but you can also perform a full load in one step. For this, the export file format of the OE2010 program was chosen (CSV format).



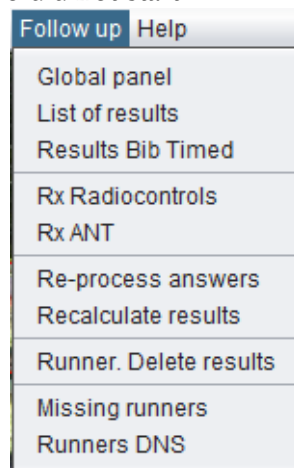
Following-up an event. It's the menu that will be used when the event is taking place. The general panel contains all the elements for downloading data from Sportident cards, manually editing them or scanning and processing paper cards, as the case may be. There is also an option to offer a list of results, which can be exported to file, projected on a separate monitor or the generation of a graphism for speaker or streaming. It exists another option to generate the graphism of the results of a bib number on normal controls or groups of timed controls.

Another functionality allows you to collect radiocontrol data stored in a remote server. When processing these data, you are achieving the goal of showing, in the list of results, a provisional classification at some intermediate point.

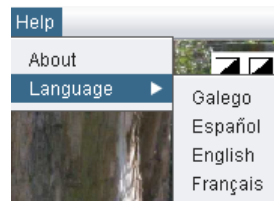
To complete the remote access functionalities, the app can also receive results from ANT.

2 additional options allow you to reprocess the answers and recalculate the results. The first only makes sense if Sportident is used and some configuration parameter is changed to control answers, such as the possibility of rectification. The second option exists as a continuation of the first one and also in case there is a need to cancel any challenge, for which an option has been enabled to proceed to the automatic recalculation of all the results. There is a residual case of malfunction in which it will be necessary to delete the results of a participant (not the participant, only the results) and therefore a specific option has been enabled.

2 lists of participants have been added, in order to assist control the event: missing runners (apparently still in the competition) and runners who did not start.



The last options of the menu allow you to see an information screen and also to change the language among the possible languages.





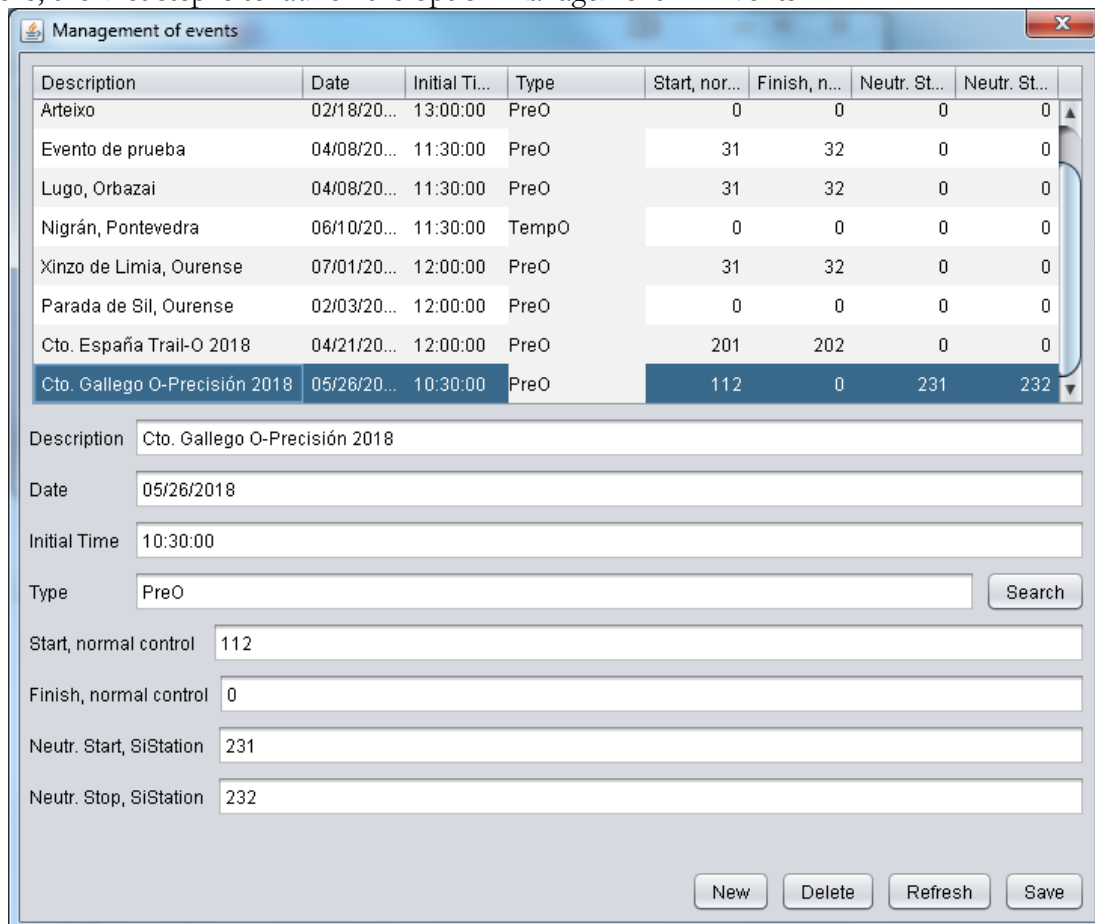
## Sequence of steps to follow

- 1.- Previous configuration
  - 1.1.- Create an event
  - 1.2.- Select the event as the current, active, event
  - 1.3.- Serial port configuration (if Sportident is to be used)
  - 1.4.- Remote servers access configuration, depending on the specific needs
  - 1.5.- Template configuration (if paper card for answers is to be used)
- 2.- Event preparation
  - 2.1.- Event categories management
    - 2.1.1.- Duplicate an existing category to compose the rest
  - 2.2.- Management of clubs
  - 2.3.- For each category
    - 2.3.1.- Management of answers
    - 2.3.2.- Management of groups of timed control
    - 2.3.3.- Management of timed controls
  - 2.4.- Management of participants
    - 2.4.1.- Import from file, OE2010 format. Uses fields license (Text1), Not Classified (nc) and card rental (Rent)
    - 2.4.2.- Manual data editing
- 3.- Following-up an event
  - 3.1.- Card readout, manual writing or semiautomatic evaluation of answers
  - 3.2.- Optionally, reprocessing answers, recalculating results or deleting results of participants
  - 3.3.- Continuous reporting of results; projection to the public
  - 3.4.- Continuous reception of punches coming from radiocontrols
  - 3.5.- Continuous reception and/or file importing of results from ANT
  - 3.6.- Speaker or streaming. Generation of graphism with provisional results
  - 3.7.- List of missing runners and runners who Did Not Start (DNS)

## Event creation

To be able to use the program you will need at least 1 event. If there is more than one, there will always be one active.

Therefore, the first step is to launch the option Management → Events



The screenshot shows a window titled "Management of events" with a table of events and a form for editing the selected event. The table has the following data:

Description	Date	Initial Ti...	Type	Start, nor...	Finish, n...	Neutr. St...	Neutr. St...
Arteixo	02/18/20...	13:00:00	PreO	0	0	0	0
Evento de prueba	04/08/20...	11:30:00	PreO	31	32	0	0
Lugo, Orbazai	04/08/20...	11:30:00	PreO	31	32	0	0
Nigrán, Pontevedra	06/10/20...	11:30:00	TempO	0	0	0	0
Xinzo de Limia, Ourense	07/01/20...	12:00:00	PreO	31	32	0	0
Parada de Sil, Ourense	02/03/20...	12:00:00	PreO	0	0	0	0
Cto. España Trail-O 2018	04/21/20...	12:00:00	PreO	201	202	0	0
Cto. Gallego O-Precisión 2018	05/26/20...	10:30:00	PreO	112	0	231	232

The form below the table shows the details for the selected event "Cto. Gallego O-Precisión 2018":

Description: Cto. Gallego O-Precisión 2018  
Date: 05/26/2018  
Initial Time: 10:30:00  
Type: PreO  
Start, normal control: 112  
Finish, normal control: 0  
Neutr. Start, SiStation: 231  
Neutr. Stop, SiStation: 232

Buttons at the bottom: New, Delete, Refresh, Save

It should be noted that all data management screens are the same and the only thing they differ in is the data they handle.

In the upper part there is a list of the existing events, with the value of their fields. In the central part each field is shown for editing. By selecting a row from the list, its values are taken to the text boxes of the central part and so that they can be edited.

At the bottom there are the action buttons:

- New. Add a new row to the list, in order to create a new event
- Delete. Erase the selected row
- Refresh. Update the data
- Save. Save changes

The normal sequence of record creation is: new; edit values in the fields; save; refresh.

An explanation of the specific fields related to the events:

- Description. A text, not very long, descriptive of the event. This text appears in the list of results
- Date. In format mm/dd/yyyy
- Initial time. In format hh:mm:ss, being hh a value between 00 and 23 (that is, 24 hour format). This value is used as the base time to calculate, for example, the departure times of the participants if their values are imported from a CSV file in OE2010 format (the departure time in that CSV, if specified, is done based on a 0 hour)

- Type. 3 values are allowed: Pre-O, Temp-O and Sprint, although the program currently does not make any distinction, being merely descriptive. For the event to behave as Temp-O other values must be configured (especially the parameters of the categories)
- Start, normal control. Sportident station number used as a start station, in case a specific start station is not used but a normal station. If a start station is going to be used, set 0 or leave empty. Otherwise, it will have the value of a normal station, that is, from 31. It is necessary to use a normal station a start one if timed controls are to be set before departure, since Sportident system does not allow to use a start station if the card already has punches
- Finish, normal control. Same as the previous one, but for the finish
- Neutr. Start, Si Station and Neutr. End, Si Station. Sportident station number used for the start and the end of a neutralization place. Several neutralizations can be performed on the field, but always using the same pair of station numbers. The program will calculate the total value of the neutralization as the sum of all the partial neutralizations

## Active event selection

As time goes by, events will have been added (and managed), so the list of events will grow. However, it is always necessary to have an event as the active event.

Code	Description	Date	Initial Time
1	Campeonato de España de O-Precisión	03/25/2016	14:30:00
2	Arteixo	02/18/2017	13:00:00
3	Evento de prueba	04/08/2017	11:30:00
6	Lugo, Orbazai	04/08/2017	11:30:00
7	Nigrán, Pontevedra	06/10/2017	11:30:00
8	Xinzo de Limia, Ourense	07/01/2017	12:00:00
9	Parada de Sil, Ourense	02/03/2018	12:00:00
10	Cto. España Trail-O 2018	04/21/2018	12:00:00
11	Cto. Gallego O-Precisión 2018	05/26/2018	10:30:00

In this screen it is enough to click on an event in the list so that the data appears in the upper part. In this way it becomes the active event.

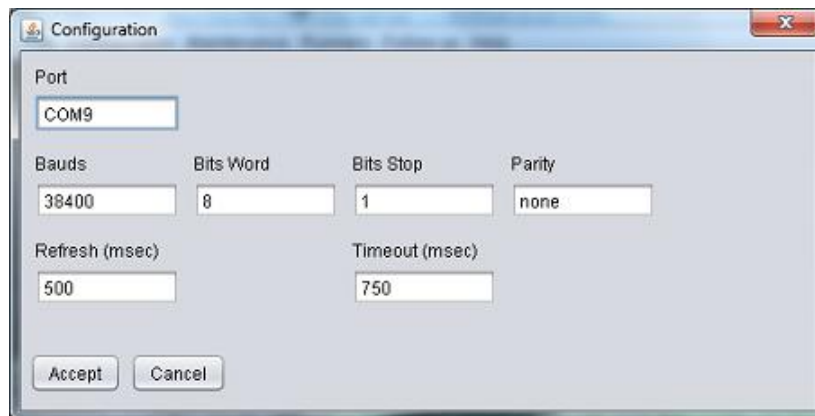
The data of the active event is saved in an XML file, so you must also click on the option File → Save configuration.

## Serial port configuration

Use this only in case of using Sportident for the total or partial management of the results.

A readout station, either USB or RS232, appears in Windows as a serial device associated with a COM port (COM1, COM2, ...) If it is RS232 it will be connected to a port that will always be the same, typically COM1. If it is USB, connecting it to a port will normally be associated with the same COM, but it does not have to be that way. To know which COM port has been associated, it can be done from the device manager, although it is very easy to know it by launching the Sportident configuration program (SiConfig +)

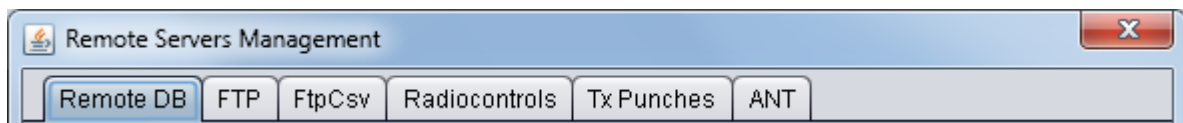
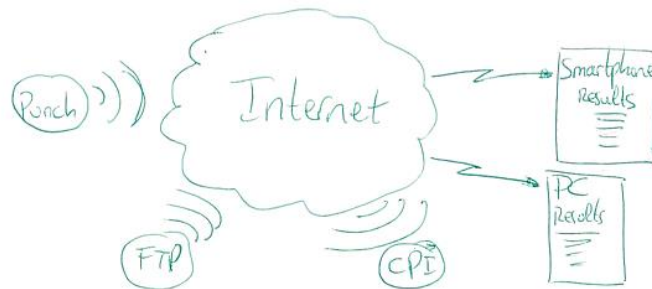
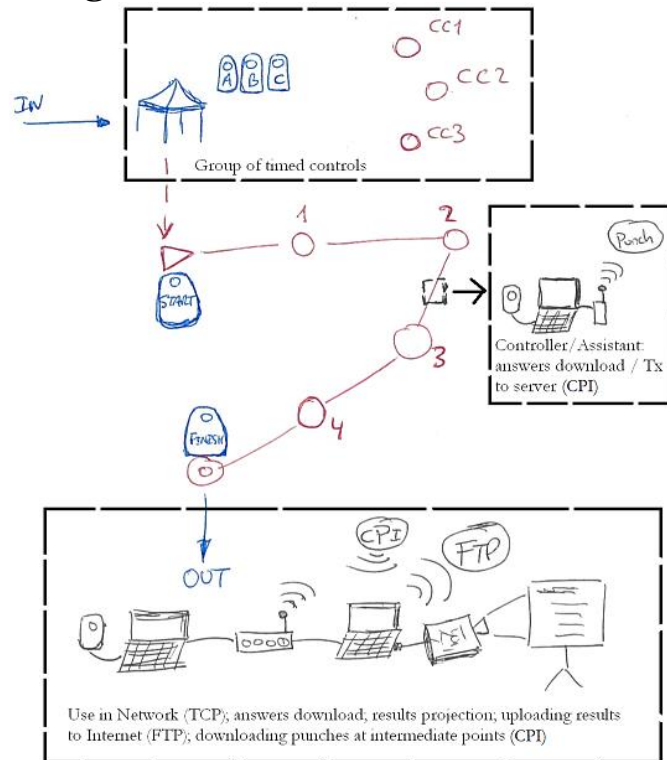
Once the port number is known, it must be written in the "Port" field in the form shown in the following image.



There is no need to change the other parameters. Sportident stations can be set to work at 4800 or 38400 baud. Although there is a specific field on the screen, you do not have to touch it since the program is going to try it at 2 speeds until the program finds out at which the station is working. The Timeout parameter is a value given in msec. Depending on the power of the computer, it could happen that the readout process cannot be done properly due to certain timeouts. You could change this value, increasing it, until you can read. This may be necessary for the old Si-5 cards. These values are also stored in a XML file.

Linux users: serial ports are typically denoted as /dev/ttyS0, /dev/ttyS1, etc. The USB serial ports are of type /dev/ttyUSB0. In the "Port" field, only the last part of the definition must be written, that is, ttyS0, ttyS1 or ttyUSB0.

## Remote servers configuration

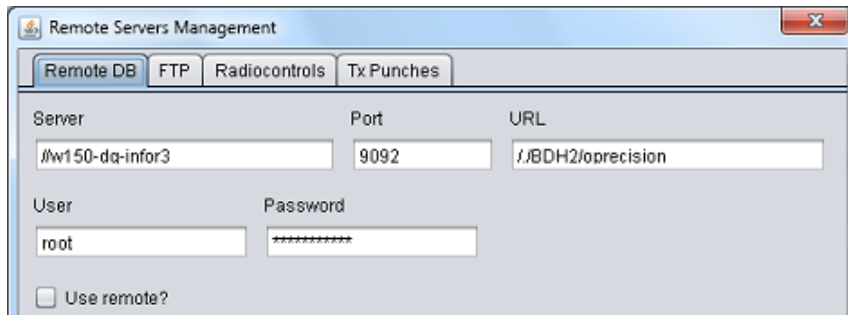


There are 4 types of servers:

- Remote DB (TCP). It allows to configure the access to the DB as local or as remote (through TCP), so that several users could share the same data from different computers
- FTP. It allows to send the results files to a specific location in a server by using the FTP protocol
- Radiocontrols (CPI). It allows to query the server that is in charge of saving times at intermediate control points, just to download these data and to show partial results
- Tx punches (Punch). Not used in this program but is part of the remote server configuration set. It allows to configure the access to the server that is in charge of saving times at intermediate control points, just to send punches from Sportident cards readout. It is used in the component of download and transmission of cards, which is part of the management of Trail-O, to send the readings at intermediate points

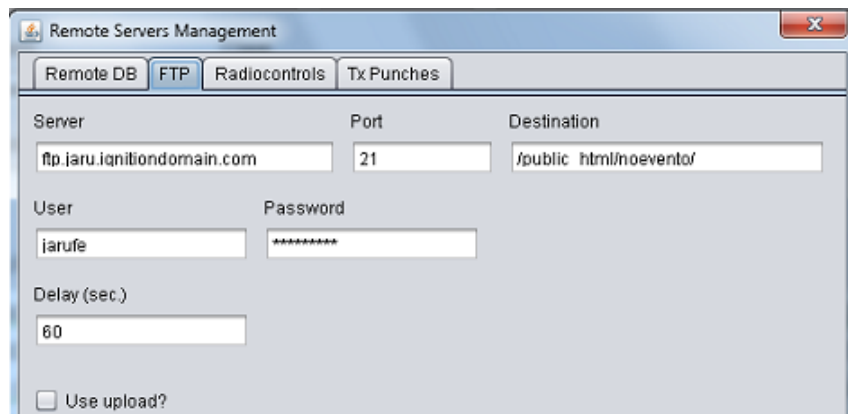
- ANT. Configuration for the access to the server where ANT results can be stored. ANT has to be configured too in order to send results to that server

The values are extracted from and stored in an XML configuration file for the 4 types of servers.

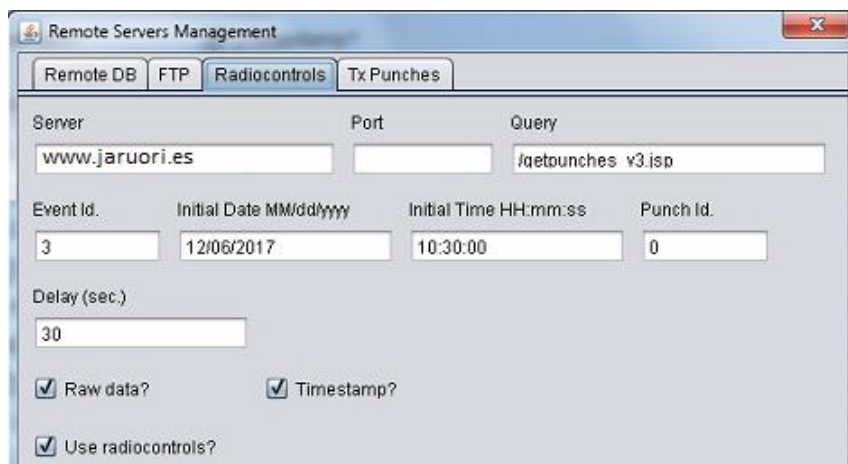


Example of TCP server configuration for DB access. The server can be specified with name or with an IP address (put the 2 bars in front, //) The check box is used to say if it is being accessed locally (unmarked) or in a shared environment (marked)

See appendix at the end of the document to know the operating steps



Example of FTP server configuration for uploading results. The server goes without bars in front. The destination is the complete path of the folder where the result files will be stored. Files to upload: HTML (results), CSV (results and graphism) and PNG (graphism and logos). The check box allows you to select whether this functionality is going to be used or not. See appendix at the end of the document

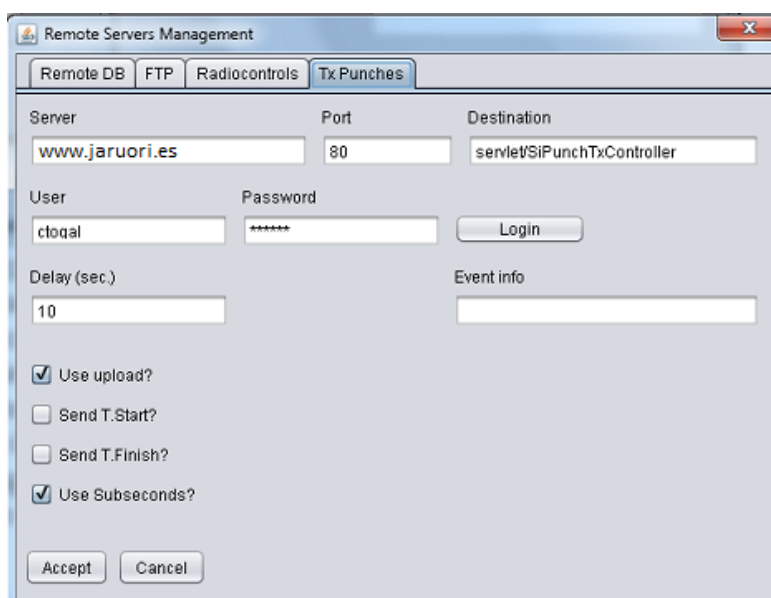


Example of CPI server configuration for downloading readings at intermediate points. The server goes without bars in front. It is not necessary to specify a port. You could leave it as it is in the image to

access the data of the CPI system (see [www.jaruori.es/minintro.jsp](http://www.jaruori.es/minintro.jsp)) but it also works if it is parameterized to access the ROC system.

The event Id. is not the same as the current event of this program. Using the CPI system you have to create an event to associate the punches sent to the server. This other identifier is which you must write in the box. The fields date, time and punch Id. are the parameters of the query. Normally we would put the date and initial time of our event and the value 0 in the identifier, to collect all the punches from that date, starting from the first. The ID value is updated automatically so as not to repeat the download of previously downloaded punches.

The first 2 check boxes indicate whether the result of the query should contain additional values (which are not currently used in this program). The last box, as in the other servers, tells the program if this functionality is going to be used or not.



The screenshot shows a window titled "Remote Servers Management" with a tabbed interface. The "Tx Punches" tab is selected. The form contains the following fields and controls:

- Server:**
- Port:**
- Destination:**
- User:**
- Password:**
- Login:**
- Delay (sec.):**
- Event info:**
- Use upload?
- Send T.Start?
- Send T.Finish?
- Use Subseconds?
- Accept:**
- Cancel:**

Example of Punch server configuration for uploading readings at intermediate points. It is not used in this main module of the Trail-O management program. It is used in another specific module that performs the readout of sportident cards and sends the content of punches to the radiocontrols server (CPI). The configuration data of the server, port and servlet must remain as they are in the image. The user and password is the one associated with the CPI event. You have to login before uploading punches to the server. The delay is not the frequency of the data upload, but is used to refresh the information back, indicating whether the upload operation has been successful. The field "event info" shows, after login, the main values of the event that has been logged.

The "Use upload?" checkbox allows you to specify whether this functionality is going to be used or not. The checkbox to use subseconds currently does not imply sending times with this sub-classification, but only to show the data on the screen in that way.

The Start station is always identified in this module with the value 1. The finish station with the value 2. The start and finish values can be sent to the server, but the Trail-O management program will not do anything with them, since that the start and finish time are only recorded in the participant's data when performing the download after the finish.

Remote Servers Management

Remote DB FTP FtpCsv Radiocontrols Tx Punches **ANT**

Server:  Port:  Query:

Event Id.:  Initial Date MM/dd/yyyy:  Initial Time HH:mm:ss:  Punch Id.:

Delay (sec.):

User:  Password:

Type of controls:  
 All  
 Timed  
 Normal

Use ANT?

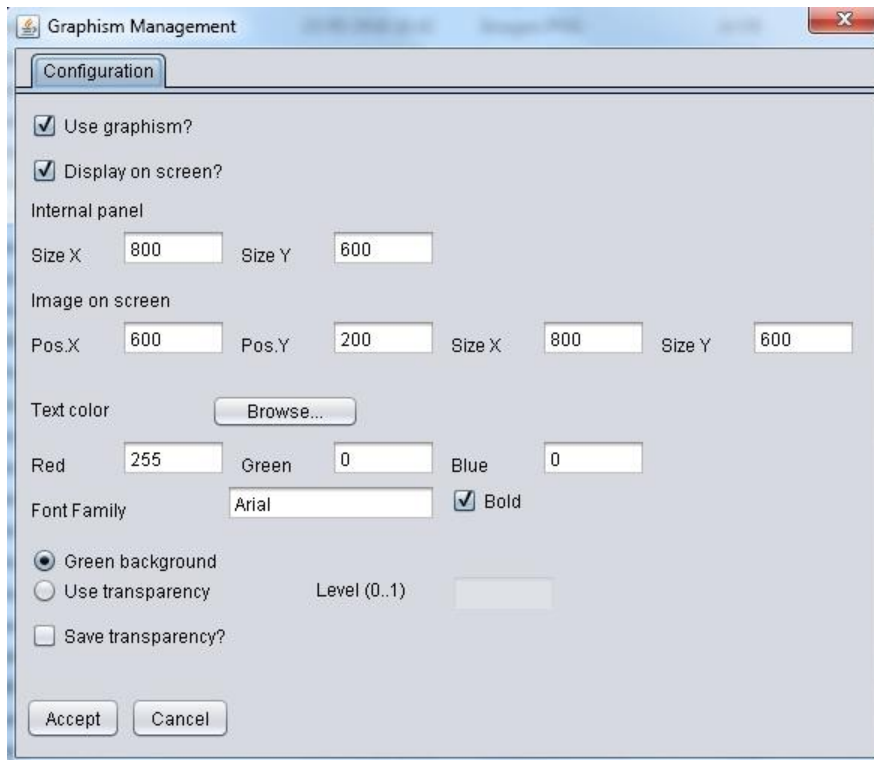
Accept Cancel

Example of configuration for the reception of results from ANT. It's almost the same as the radiocontrols server. The parameters and their use is almost the same; they have been duplicated in order to let the use of different values. The only difference is in the query page to obtain the data and the radiobuttons to filter for the type of results. The user can ask to download the results from timed controls only, from normal controls only or from both of them.



## Graphism configuration

The graphism is an image with results that is generated to be overlapped on top of another graphical content, for example a live video streaming. There are some configuration options.



It is stored in an XML file, ParametrosGrafismo.xml. The file is read when entering the application. The graphism is an image in PNG format, grafismo.png, which is created by clicking a button in any of the results screens (results of a bib number or results list)

2 initial checks allow the user to decide if the graphism will be used (the button to create the graphism is displayed or hidden as it is marked or not) and if it is going to be displayed (if it is not marked, the file graphism.png is created but it is not displayed on the screen)

The graphism is drawn on a canvas that has the size indicated in the parameters "Internal Panel"

In case you want to display the image on the screen, it will be shown in the position and the size indicated in the "Image on screen" parameters.

You can indicate the color for the text, either by selecting it from a color selector, or by writing the values of the RGB components, which will be values between 0 and 255. You can also write the name of a font family and decide if you want to put it in bold.

There are several options for setting the background of the image. A green background can be drawn, which the final user of the graphism would use to set the transparency of the image; the other option is putting a white background and indicating a level of transparency between 0 (totally transparent) and 1 (totally opaque)

Regardless of the option indicated for the background (green or white with transparency level) it is possible to decide whether or not to save the transparency information in the generated file. If yes, when the image is displayed, no additional operation is necessary to establish transparency; it will be enough for the program used to be able to interpret that information. If it is not stored, the final user will have to apply transparency on its own and the green color must be indicated as transparent (R = 0, G = 255, B = 0)

## Manual answers template configuration

Only in case of using the semiautomatic mode of operation, with the use of a manual response card and scanner to digitize the answers provided by each participant.

In case of using Sportident or manual introduction of answers it is not necessary to proceed with the transcription of the physical template design.

The screenshot shows the 'Management of results' software interface. On the left, there are configuration fields for '#Max.Options' (6), '#Max.Controls' (20), 'Cell X Size' (78), and 'Cell Y Size' (75). Below these are buttons for 'Browse file', 'Delete', 'Reset tables', 'Cell Size', 'X Positions', 'Y Positions', 'Accept', and 'Cancel'. A table titled 'Options' shows a mapping of Order# to Value for X and Y positions. On the right, a large grid shows a 20x6 grid of answer boxes labeled 1A through 20Z. The grid is divided into sections: 'PUNTAJON FINAL' (3A-3Z), 'TIEMPO FINAL' (4A-4Z), 'TEMPO DE ESPERA' (5A-5Z), 'TEMPO DE SALIDA' (6A-6Z), 'TEMPO DE SALIDA' (7A-7Z), 'TEMPO DE SALIDA' (8A-8Z), 'TEMPO DE SALIDA' (9A-9Z), 'TEMPO DE SALIDA' (10A-10Z), 'TEMPO DE SALIDA' (11A-11Z), 'TEMPO DE SALIDA' (12A-12Z), 'TEMPO DE SALIDA' (13A-13Z), 'TEMPO DE SALIDA' (14A-14Z), 'TEMPO DE SALIDA' (15A-15Z), 'TEMPO DE SALIDA' (16A-16Z), 'TEMPO DE SALIDA' (17A-17Z), 'TEMPO DE SALIDA' (18A-18Z), 'TEMPO DE SALIDA' (19A-19Z), and 'TEMPO DE SALIDA' (20A-20Z). The grid also contains text for 'ORIENTACION DE PRECISION' and 'fedo'.

You can see in the figure that it is not necessary to use the entire card, but only one of the parts, the part kept by the organization. The parameterization of the cards is based on the idea that the boxes will keep proportionality and symmetry. If this is not the case, it will not be possible to parameterize in this program.

There are several groups of values that can be set manually or automatically:

- General values
  - o Maximum number of options. In the example you can see that there are 6, from A to E plus Z. Here you could define many more than 6, but the program is only configured to work with up to 7, from A to F plus Z
  - o Maximum number of controls. In the example you can see that there are 20. It does not matter if the event in question will consist of less. In this configuration all the boxes are defined, but it does not mean that in the event all of them will be taken into account
  - o Tam X and Y of the boxes. Width and height in pixels of the card once digitized. It can be written manually, but it will be better to do it with mouse clicks on the image that is shown on the right side
- Option values. Write the letters that identify each of the answers, as they are read in the scanned image from left to right. In the example, A-B-C-D-E-Z

- Position values
  - o X positions. Coordinate in pixels of the left corner of each option. It can be written by hand, but it is normal to do it with mouse clicks on the image
  - o Y positions. Coordinate in pixels of the upper corner of each answer. The same as for the previous case, it's better to define it with clicks

Definition method. This is performed by using the buttons of the central part.

**Step 1.** Select image. You need a well scanned image of the part of the card that is going to be kept by the organization. Press this button and you can select the desired image, which is displayed on the right side of the screen

**Step 2.** Write the maximum number of options and controls

**Step 3.** Press the "Reset tables" button so that the tables at the bottom are updated with the correct values as established in step 2

**Step 4.** Set the size of the boxes. Press the "Cell Size" button. Then, a simple click is made in the upper-left corner of any box (inside) and then another click in the lower-right corner (inside). After the second click, the program calculates the width and height of the cell and writes the correct values in the corresponding fields.

**Step 5.** Set the X positions. Press the "X Positions" button. Then, you have to click on the part to the left of each option (inside). The program calculates the correct coordinate and writes it in the corresponding row of the table of X positions.

**Step 6.** Set the Y positions. Press the "Y Positions" button. Then, you have to click on the top of each control (inside). The program calculates the correct coordinate and writes it in the corresponding row of the table of Y positions.

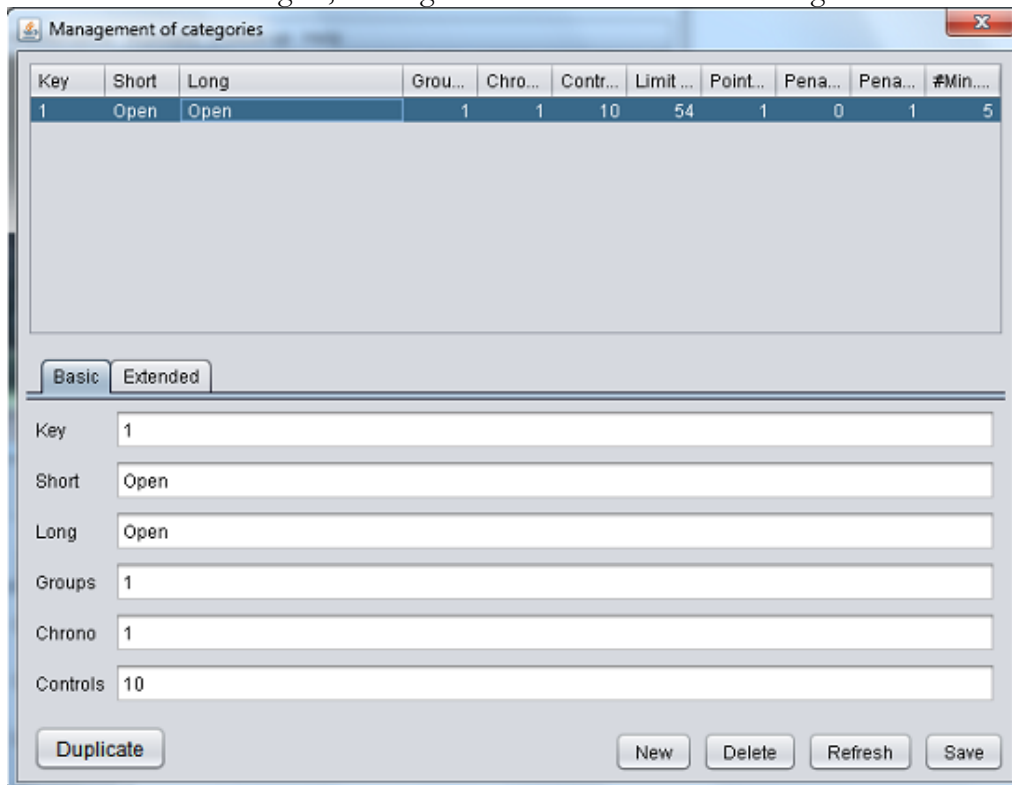
**Step 7.** Write the values of the answers in the table of options as they are read from left to right in the image. In the example, 1 is A, 2 is B, 3 is C, 4 is D, 5 is E and 6 is Z

**Step 8.** If everything is ok, click "Accept" to save the configuration. Otherwise, press "Cancel". The configuration of the template of each event is saved in a specific XML file that is stored in the subfolder dedicated to each event. In addition to the XML file, the patterns corresponding to each box are also extracted (graphic elements that will be used in the automatic process of recognition of responses indicated by the participants for each challenge)

"Delete" button. Removes all of the configuration and images files stored in the folder related to the templates of the event.

## Category management

Upon reaching this point, the system configuration phase has been completed and the configuration phase of the active event data begins, starting with the definition of the categories.

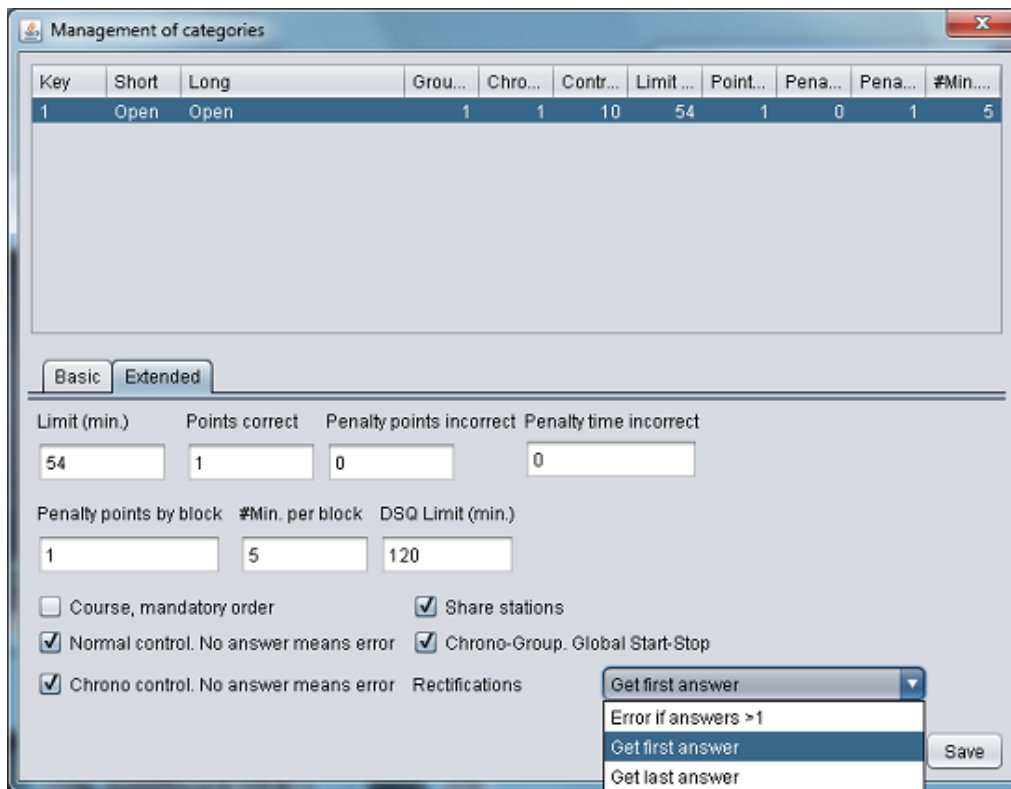


You can see that the screen is similar to the event management, so the use principles are the same. More parameters have been introduced with respect to the previous version, so the lower part of the screen has been distributed in 2 tabs.

Specific data of the first tab:

- Key. All data in the program has an internal identifier. This key is a value that can be given to identify the categories if the CSV file of the OE2010 is used for the loading of participants. The value is the one that was given to the category identifier in that file
- Short, long. Category description
- Groups. Number of groups of timed controls. It is usual for events to have, for example, only 1 place (before the start or after the finish) where to perform the timed controls, which can be more than 1. Therefore, here you specify how many groups there are
- Chrono. Total number of timed controls. For example, if there is 1 group of timed controls at the start and 1 additional group at finish and there are 2 controls on the first and 3 on the second, in this field you have to write the value 5 (2 + 3)
- Controls. Number of normal challenges

The button “Duplicate” serves to create a new category from an existing one. Fields Key, short name and long name must be provided. The procedure duplicates all of the configuration of the existing category. This can save time when creating categories that are very similar in a Trail-O competition.



Specific data of the second tab:

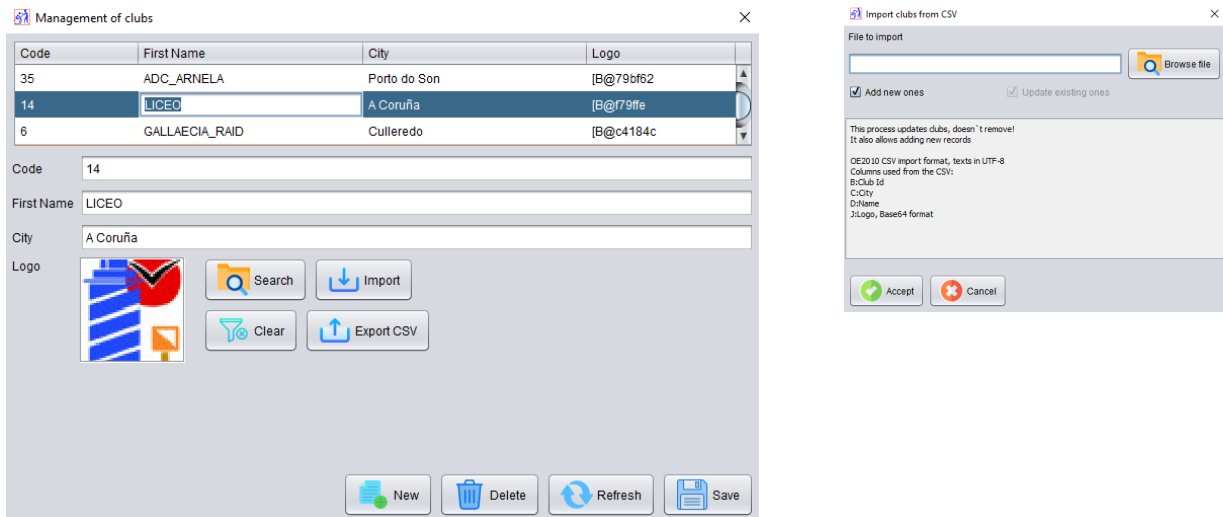
- Limit (min). Value in minutes of the limit set to make the course. It will be used to set penalties for time exceeded
- Points correct. Points that add up for each successful normal control
- Penalty points incorrect. Points that are subtracted for each normal control missed
- Penalty time incorrect. The same as before, but involving the time accounted for the timed controls
- Penalty points by block. Points that are subtracted for each block of time exceeded over the limit that has been set
- #Min. Per block. Number of minutes that form each block. In the example, 1 point will be subtracted for each 5 minutes (or part) exceeded from the limit of 54 minutes set
- DSQ Limit (min.). Value in minutes for the limit that has been set to consider a participant as Out of time. In the example, if the participant takes more than 120 minutes in making the course, then his status is set to "ot"
- The rest of parameters are only taken in account if Sportident is used:
  - o Course, mandatory order. If checked, a final check is made to determine if the normal controls have been answered in the sequence in which they were designed
  - o Normal control. No answer means error. If checked, it does not matter if you answer badly to a normal control. This is what is currently established in the standards, but in the future a distinction could be made and this parameter prepares us for this
  - o Chrono control. No answer means error. The same as the previous one, but for timed controls
  - o Share stations. It tells the program that the organizer will use the same stations for controls that are part of the same group, so that stations can be reused and thus reduce the total number needed (implies that more punches will be necessary; it will be explained later)
  - o Chrono-Group. Global Start-Stop. If checked, a single timing for all the timed controls of the same group is going to be performed. If unchecked, you will perform an individual timekeeping for each timed control

- Rectifications. 3 options are allowed:
  - Error if answers > 1. If the Sportident card shows more than one answer for a control (normal or timed) then the system decides that there has been an error in the answer (error if rectified)
  - Get first answer. Even if several answers are marked for a control, the system takes the first one (no rectification allowed but doing so is not an error)
  - Get last answer. Even if several answers are marked for a control, the system takes the last one (rectification is allowed)

## Club management

The participants are grouped in clubs. Here you can register manually, although the ideal is to make a bulk upload via CSV file. When the participants are loaded in this massive way, a box can be indicated to automatically obtain the club data.

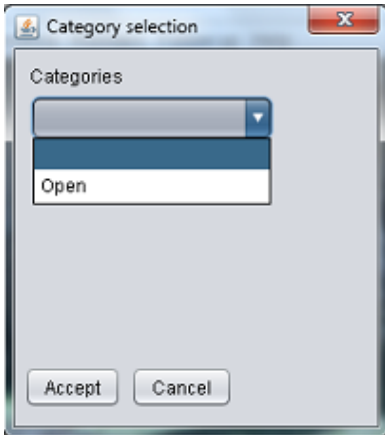
The management screen allows you to select an image that represents the club's logo. The logo is used at the results list.



Club data and their logos can be exported to a text file in CSV format (logos are exported as Base64 text). This makes it easy to reassign logos to clubs between events, as there is also an option to import data. The import modifies the existing data from the CSV file and also allows adding new club data. To search for clubs, the value of the code field is used.

## Management of answers by category

Here you configure the values that define the options and valid answers of each normal control. First you have to select the category you want to edit, which is done through a drop-down that lists all available categories.



After selecting a category, you access the main screen for managing the questions. It is necessary to establish the order number of each challenge, the available options (it is only a descriptive text, some possible values: A-B, A-E, A, etc)

**IT IS MANDATORY TO SET THE ORDER NUMBER CORRECTLY, STARTING BY 1 WITHOUT SKIPPING VALUES**

In addition to say what the options are, you have to write what is the letter of the correct answer.

During the execution of an event it is possible that a challenge has to be annuled, which will not be able to be used to calculate the results and classifications. This is done by checking the "Void" box.

If you are going to use Sportident to check answers, you must write the number of each station as it is going to be available on the field. Here you can see that there is a dynamic amount open to any number of options. They can be managed from A to F plus Z. In the example you can see that it is an event in which there will always be a correct answer, that is, the Z will not be used.

Order#	Options	Correct	Void	Si A	Si B	Si C	Si D	Si E	Si F	Si Z	Si Sel.
1	A-B	B	<input type="checkbox"/>	33	34						
2	A-B	B	<input type="checkbox"/>	35	36						101
3	A-C	A	<input type="checkbox"/>	35	36						101
4	A-E	D	<input type="checkbox"/>	40	79	42	43	44			102
5	A-E	B	<input type="checkbox"/>	40	79	42	43	44			102
6	A-C	B	<input type="checkbox"/>	81	82	83					
7	A-C	C	<input type="checkbox"/>	84	85	86					
8	A-C	B	<input type="checkbox"/>	91	92	93					
9	A-C	C	<input type="checkbox"/>	94	95	96					
10	A-B	B	<input type="checkbox"/>	90	100						

Order#

Options

Correct

Void

Si A  Si B  Si C  Si D  Si E  Si F

Si Sel.

The example also represents the case where several controls will reuse stations (because they have the same decision point from which they can respond to the same group of stations that host several different challenges)

In order for the program to know when it is answering to another control instead of rectifying a response, a field has been added that is called "Si Sel." (Sportident control selection) In the example, controls 4 and 5 share stations. Station 102 is added to be able to select the control, in what way? When the participant arrives at the decision point, he first scores at the selection station (102); then responds to the challenge of control 4 (from A to E); subsequently he re-scores at the selection station (102); finally responds to the challenge of control 5 (again from A to E by marking in the same set of stations) Let's imagine that rectifications are allowed and that the last answer is taken. The user selects 102, then responds to control 4, marking for example A; rectifies and marks B; then re-marks the 102 to change to control 5, marking C, D and finally E. For the program, control 4 would have the answer B and 5 the E. If the competitor forgets to punch the 102 between one control and another, only the response E associated with control 4 would appear and no response associated with control 5 would appear.

In practice, it has been observed that some participants forget to mark the selection station the first time, probably thinking that first comes the answer and then the selection. Trying to avoid as much as possible errors undoubtedly due to competition nerves, the program has been modified so that it checks whether the first control has been responded before marking the selection station. Still, it is desirable to teach a single way of acting, always marking the selection station first.

The participant has always punched the selection station first, and then the answer

The participant has always forgotten to punch first the selection station, but the program interprets that he's answering

NOTE: if you want to delete some value in this screen and leave it empty (when you entered it by mistake or another cause) the program ignores the fact if it is done from the bottom of the screen. In the case of the Sportident station numbers, a value of 0 can be written, although the value can also be deleted if it is done from the list at the top of the screen. This applies both to this management screen and to the rest of the ones that make up the program.



## Management of timed groups by category

Here you configure the values that define each of the timed controls groups. As in the previous case, you must first select a category. Then, you can access the management screen itself.

For each group it is necessary to establish an order number and a description (start, finish, intermediate, etc) **YOU MUST SET THE ORDER NUMBER CORRECTLY, STARTING BY 1**

The management values have the following meaning:

- Limit (sec.). Maximum number of seconds available to solve all the challenges that belong to the group. It is only active if the timing is global to the whole group. In case the timing is individual to each timed control, the limit is defined in each one of them
- Penalty point exceeded. Number of points to subtract if limit is exceeded
- Penalty time exceeded. Seconds to be added to the total time if limit is exceeded
- Si Station Start. Number of the Sportident station that will be used to start the timing
- Si Station Stop. Number of the Sportident station that will be used to stop the timing. Actually, the timing stop is controlled by the time at which some option of the last control of the group was marked. This stop station can be used as an alternative, to first perform the timing and then the answering, that is, first the start station is marked to start the timing; at the end of the process, the stop station is marked to finish the timing; finally, calmly, you can now mark the response stations
- Si Stations for the answers, A-E and Z.

The station numbers (start, stop and answers) will only be active if the “station reuse” parameter has been set for the category. In this way what is being done is to define the stations in one place, the group. Otherwise, if they are not reused, the stations must be defined for each timed control separately

In the timed groups it is usual to establish a manual timekeeping, with 1 or 2 people who perform the timing by a stopwatch. Here is the possibility of using normal Sportident stations to perform that function. **THEY ARE NOT STATIONS OF START AND FINISH BUT NORMAL STATIONS ACTING AS CONTROLS.**

If you want to use Sportident, one way to do it would be as follows. The participant follows the instructions of the person in the organization. When everything is explained, the participant is the one who initiates the timing by marking at the start station. As the participant solves the challenges, he marks the corresponding answers. When he answers to the last challenge, the time of that punching represents the stop of the timing. If the participant doesn't answer to all the challenges when the time limit is reached, the organizer can tell him to punch at the stop station or nothing, as not marking already implies that the time limit has been reached.

The person of the organization could use paper, with a paper & automatic duplicity, to have a B plan before protests, doubts or management errors.

The other way of using Sportident is the one indicated when talking about the stop station. The staff of the organization is responsible for everything and the participant acts as in the traditional method of response (signaling or speaking). One of the organizers is responsible for starting and stopping the chronometer by marking the start and stop stations. Another of the organizers writes out on paper the participant's answers. At the end of the timing, the organizer is responsible for marking the answers on the Sportident card.

Order#	Description	limit (#sec.)	Penalty point...	Penalty time ...	SiStation Start	SiStation Stop
1	Grupo	60	0	0	64	65
2	Grupo 2	60	0	0	66	67

Order#

Description

limit (#sec.)

Penalty points exceeded

Penalty time exceeded

SiStation Start

SiStation Stop

SIA  87    SIB  88    SIC  97    SID  98    SIE     SIF     SIZ

New   Delete   Refresh   Save

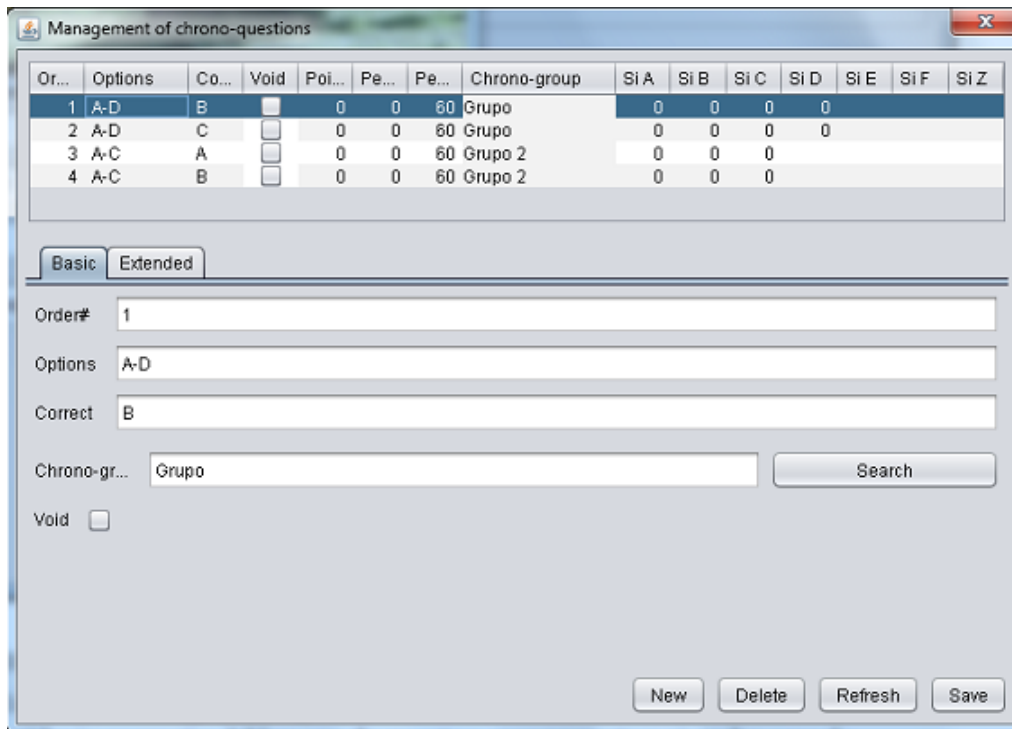
In the example you can see that no penalty time is applied if the time limit is exceeded. This is because in reality the time limit is already a time that is going to be taken into account.

## Management of timed controls by category

In the previous screen, the parameters defining the timed groups were configured. But it remains to establish the configuration of each of the individual controls that make up the groups. This is done from this screen. As in the previous case, you must first select a category. Then, you can access the management screen itself.

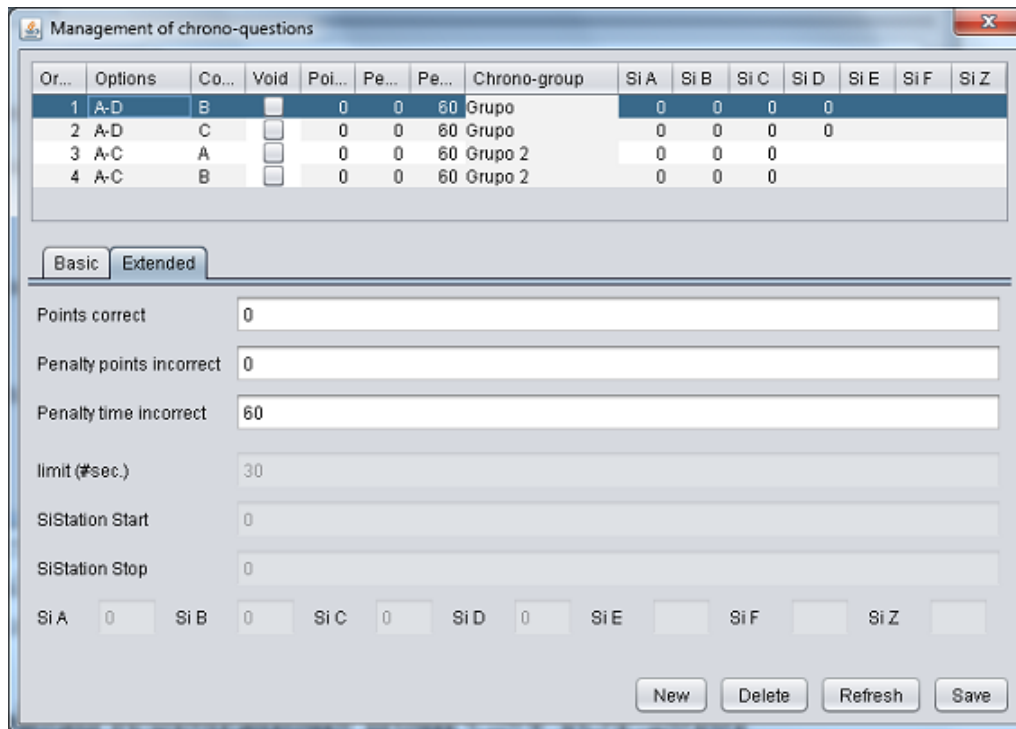
The set of values is distributed in 2 tabs. The additional fields of the first have the following meaning:

- Order#. Start from 1 and assign incrementally keeping the order of the timed controls on the field
- Options. Descriptive text as it appears on the control description sheet
- Correct. Letter (capital letter) of the correct answer. It's important to write it well because it's the value used by the program to compare with the answer given by the participant
- Chrono-Group. You have to select which timed group it belongs to
- Void. The checkbox must be checked in case the control is annulled afterwards



The additional fields in the second tab have the following meaning:

- Points correct. Points that add up for each successful control
- Penalty points incorrect. Points that are subtracted for each missed control
- Penalty time incorrect. Seconds that are added up to the timing if missed
- Limit (sec.). It is only active if the timing is individual for each control of a group (established in the management of the category) It is the limit in seconds to respond to the challenge
- Si Station Start. Number of the Sportident station that will be used to start the timing of the control. It is only active in the case that stations are not reused. In case of sharing stations, they are defined only once for all controls of the same group in the group parameter definition screen
- Si Station Stop. Number of the Sportident station that will be used to stop the timing. Actually, the timing stop is controlled by the time at which any control option has been marked. This station can be used as an alternative, as explained above
- Si A, (B, C, D, E, F or Z) In case of using Sportident, number of the station corresponding to each answer. It is only active in the case that stations are not reused



In the image, all the fields in the lower part are inactive, since timing has been set as global to an entire group and stations are also shared for the controls of the same group, so these parameters are defined only at the level of group

## Participants. Upload registrations from CSV (OE2010)

The fastest way to register the group of participants is carrying out a massive load. The export format (in CSV) of the OE2010 program has been chosen. This has an explanation. OE2010 is the most used program in the field where this management system has been developed (FEGADO, the Galician Orienteering Federation) and the event registration system used on the FEGADO website provides a file in that format. Therefore, by registering an event in the FEGADO and allowing the registration of the participants, the organizer of the event can now download that CSV file and import it into its management program.

The export format of OE2010 in CSV is known, so it is very easy to adapt and generate it, whatever the origin of the entries, a file with the participants in a Trail-O event. It is a text file and the values must be separated by the symbol ;

The import screen is very simple. You can write or select the file you want to import. You can also check a box that indicates if you want to regenerate the list of clubs from the data contained in the registration file.

When accepting, it proceeds to the deletion of the existing data (participants always, clubs depending on the case) and to the import of the new ones.

In the registration file:

- Assign a number to each participant. It is the basic form of identification of each participant
- If using Sportident, assign an electronic card
- You can assign a start time already in the registration file. In that case, do it based on a 0 hour.

The program uses the time set as initial in the event to calculate the current start time.

Normally, in a Trail-O event the pre-assigned start time is used to order the call of the participants, but the start time used to calculate the effective time used by each participant may be different, especially in the case that timed controls have been placed at the beginning of the event

- Assign the identifier of the category as indicated in the category management screen. The identifiers in the file and in the program have to match
- In case of not replacing existing club data, assign the club identifier as indicated on the club management screen. As in the previous point, the identifiers in the file and in the program have to match
- An additional field can be passed, license, in column Text1 (column AJ in Excel) in case you want to uniquely identify the participants throughout an entire season, for example to make a ranking
- “nc” column can be used (column K in Excel) to indicate runners that are out of competition (not classified). Also “Rented” (column AY) to indicate that the SiCard has been rented. In both cases, use the value X when applies.
- Make sure that the CSV file is saved following the UTF-8 encoding format. This is so to be able to handle special characters without problems (accents and eñes in the case of Spanish) It is very easy. Just open the CSV file in the notepad and press "save as", establishing the name (you can overwrite it) and selecting UTF-8 in the box that says "coding" or “codepage”



## Participants. Managing participants manually

Whether the participants have been imported using the bulk loading method or if you want to do it manually, a management screen is available to perform all the editing operations on the data set. From the management screen you can modify the existing data and also add or delete participants. The basic data are the number, surname, name and electronic card number (the latter only if you use Sportident)

Optional information is the start time and finish time. In the list it is displayed in real time and format hh:mm:ss (24h). During the follow-up of the event, these data will become valuable when the answers of the participants are recorded and will be reflected in this list. If the value is manually edited from this screen, you only need to type the real time in format hh:mm:ss; the date will be that of the event.

Additional information is the club and participation category. The 2 values are selected from their respective drop-down list. It is important not to forget the category of participation, because it is the way to group the participants, to be able to check their results and obtain a classification.

The screenshot shows a software window titled "Management of runners". At the top, there is a table with the following columns: Bib#, First Name, Last Name, SiCard, Start, Finish, Category, and Club. Two rows of data are visible:

Bib#	First Name	Last Name	SiCard	Start	Finish	Category	Club
174			9201095			Open	GALLAECIA RAID
486			2066921	12:09:41	12:30:09	Open	LIMIACTIVA

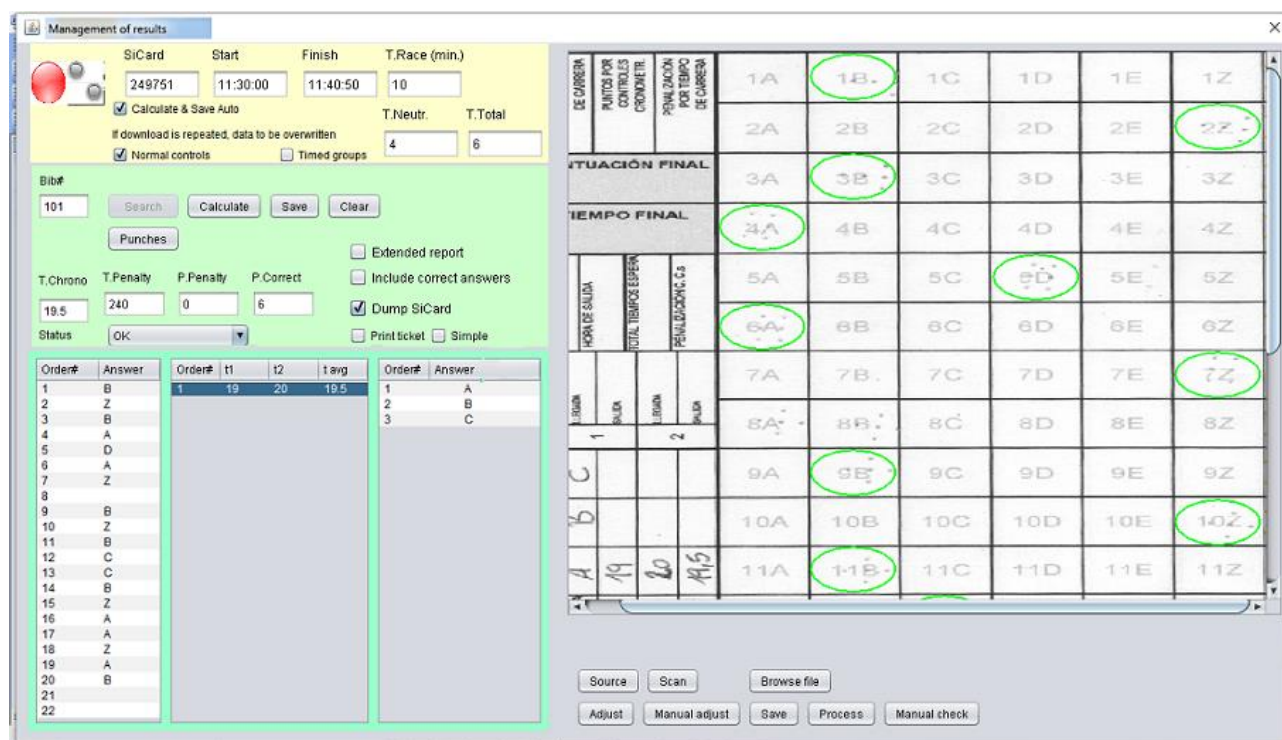
Below the table is a form for editing or adding a runner. The fields are as follows:

- Bib#: 174
- First Name: F...
- Last Name: C...
- SiCard: 9201095
- Start: (empty)
- Finish: (empty)
- Category: Open (with a Search button)
- Club: GALLAECIA RAID (with a Search button)

At the bottom of the form, there are two checked checkboxes: "Non Classified" and "Rented chip". On the far right, there are four buttons: "New", "Delete", "Refresh", and "Save".

## Follow up. General panel

When the event is taking place, the general panel is the core of the program, the place where most of the management will take place. This is true regardless of the chosen method for managing the answers and results (manual, semi-automatic or Sportident)

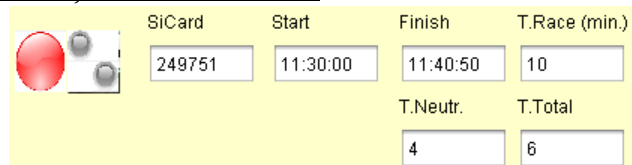


View of the general panel with some sample data

The panel is divided into 4 areas: management of sportident + annotation of start and finish times; calculated values and boxes and keypad to perform some actions; tables where the answers are written down; management of scanned documents (in case of using semiautomatic mode).

In general, the sequence of steps to be taken is very simple: the participant is searched, their answers are recorded and start and finish times, their results are calculated and, optionally, a ticket is printed for the participant. There are several options depending on the operating mode, so details will be given to explain the use of each part of the screen.

### Management of Sportident, Start and Finish



The graphical control on the left is used to operate the Sportident readout station (only if this system is used). Red indicates that there is no connection. In green it indicates that it is connected and ready to use. If it is red, the operator has to click on the circle to try to put it in green.

The two smaller circles flash (and the computer emits an audible signal) when it has finished reading a Sportident card. NOTE: THE PROGRAM DOES NOT ASK THE STATION TO EMIT THE LUMINOUS + SOUND SIGN.

If a Sportident card has been inserted in the readout station, at the end of its reading, a search is carried out of the participant who has been assigned the card number read. In that case, the data is retrieved and displayed on the screen. As a new reading has been made, the start and finish times are written on the screen, as well as the answers to the controls, both normal and timed. In case the participant is not

found, the program asks the operator to enter a bib number. In case this data cannot be indicated either, the program gives the option to add a new participant at that moment.

The program is prepared to be able to reuse electronic cards, that is, not permanently associate a card with a participant. In this way, when a second participant downloads a card already used in the event, the program will ask the operator to indicate if he wants to overwrite the data of the previously assigned participant or if he wants to assign the data to another different participant.

The start and finish times can be recorded manually. The time (min.) is not necessary to calculate it. There is a button in the next group that already performs that work.

The electronic card number (SiCard) can also be written manually to be used as a search criterion if another button is pressed in the next group of controls.

Checkboxes:

- Calculate & Save Auto. If checked, when downloading, the calculation and recording of the data in the BD is already carried out. If the print ticket checkbox is marked (see below) then it also prints it
- If download is repeated, data to be overwritten → Normal controls and/or timed controls. This allows handling of the case where an SiCard is read again and data is to be overwritten. There are cases in which you should not overwrite any of the data. For example, if ANT is used to manage timed controls, that information is already transmitted before the readout and therefore during the readout there is no need to overwrite that information.

### Manual search of participant, calculations and other operations

T.Chrono	T.Penalty	P.Penalty	P.Correct
19.5	240	0	6

If the operator writes a number, he can click on the "Search" button to find it in the database and retrieve the values already stored.

Buttons:

- Calculate. Given the values written in the other control groups, calculates the effective time and score, automatically writing the corresponding boxes
- Save. Stores the data in the database. It is also used to obtain the corresponding receipt if you have checked any of the check boxes
- Clear. Discard the changes and empty the fields to continue with the next participant
- Punches. If Sportident is used, when a participant downloads his card the data of markings are stored in the DB. By clicking on this button you can access a form that lists all the markings, with its time of marking, station number and the meaning it has depending on the configuration of the program (start station, answer to a timed control, start-up of a group of timed controls)

Text fields:

- T.Chrono. Sum of the seconds needed in the realization of all the groups of timed controls
- T.Penalty. Sum of the penalty seconds that has been suffered in all groups of timed controls
- P.Penalty. Sum of all penalty points applied, either by exceeding the available time limit or those applied in the timed control groups, if applicable
- P.Correct. Sum of all the points obtained by correct answers, either from the normal controls of the timed ones, if applicable



- Status. Indicates the status of the participant. The same possible values are used as in the OE2010 program: OK, DNS (Did Not Start), DNF (Abandon or Did Not Finish), MP (Missing punch), DSQ (Disqualified), (Ot) Out of time. Some are calculated automatically, such as OK, did not start, Missing Punch or Out of time. These and the rest can be set manually (for example, to indicate that the organization of the event has disqualified a participant)

Checkboxes. They serve to obtain a more or less complete personalized report:

- Extended report. If unchecked, the report that is obtained is basic: participant, points obtained, time of the groups of timed controls. If checked, it also includes each of the answers given by the participant and the time invested and answers given in the timed controls groups
- Include correct answers. If checked, the correct answers are also included in the report, so that the participant can carry out the verification of the values that make up his results by himself.
- Dump SiCard. If the simple ticket is printed, a full dump of the contents of the SiCard can be added. If you also include the correct answers then the markings are described to indicate what each of them means (station, time, description)
- Print ticket. The above is not worth anything if this box is not checked. When checked, by pressing the "Save" button you get the corresponding receipt and send it to the printer. In addition to sending it to the printer, it is stored in the form of a file, with the name "ticket.html". The printing process can be canceled, so it is not mandatory to spend paper
- Simple. There are 2 ticket formats, designed for a normal printer or for a receipt printer. The simple ticket tries to reduce the necessary space so that it fits vertically in a receipt printer. Currently the program is not able to print correctly on some printers of this type so the solution by now is to write a text file called "ticket.txt", which can be opened in the notepad and be sent manually to the receipt printer

### Some examples of tickets

```

Xinzo de Limia, Ourense, 07/01/2017; PreO

Bib#:60 Name: Aroa Limia, Galicia
Category:Open Club:AROMON SiCard:7209380
Status:OK
Points:7 Time:29
  
```

Normal ticket, without answers or verification of correct ones

```

Xinzo de Limia, Ourense, 07/01/2017; PreO

Bib#:60 Name: Aroa Limia, Galicia
Category:Open Club:AROMON SiCard:7209380
Status:OK
Points:7 Time:29

Answers
1 2 3 4 5 6 7 8 9
B B B C A C A Z A

t1 t2 tavg
Chrono-group 1 29 29 29.00

1 B
2 C
3 E
  
```

Extended ticket, with answers given by the participant

**Xinzo de Limia, Ourense, 07/01/2017; PreO**

**Bib#:**60 **Name:** Xinzo de Limia, Ourense, 07/01/2017; PreO  
**Category:**Open **Club:**AROMON **SiCard:**7209380  
**Status:**OK  
**Points:**7 **Time:**29

**Answers**

1	2	3	4	5	6	7	8	9
B	B	B	C	A	C	A	Z	A

Chrono-group 1 29 29 29.00

1	B
2	C
3	E

**Correct**

1	2	3	4	5	6	7	8	9
B	B	B	C	B	A	A	Z	A

Chrono-group 1 B C E

**P.Correct:**7 **P.Penalty:**0  
**Time (min.):**14 **T.Chrono:**29 **T.Penalty:**0

Extended ticket + indication of correct answers. In the case of the neutralizations, 2 fields are inserted between the time and the chrono. Those are the neutralization time and the total time (time – neutralization). All values are given in minutes

**Xinzo de Limia, Ourense, 07/01/2017; PreO**

**Bib#:**60 **Name:** Xinzo de Limia, Ourense, 07/01/2017; PreO  
**Category:**Open **Club:**AROMON **SiCard:**7209380  
**Status:**OK  
**Points:**7 **Time:**29

Controls	Answer	Correct
1	B	B
2	B	B
3	B	B
4	C	C
5	A	B
6	C	A
7	A	A
8	Z	Z
9	A	A

Chrono-group 1 29 29 29.00

1	B	B
2	C	C
3	E	E

**P.Correct:**7  
**P.Penalty:**0  
**Time (min.):**14  
**T.Chrono:**29  
**T.Penalty:**0

Xinzo de Limia, Ourense, 07/01/2017; PreO  
Bib#: 60  
Name: Xinzo de Limia, Ourense, 07/01/2017; PreO  
Category: Open  
Club: AROMON  
SiCard: 7209380  
Status: OK  
Points: 7 ; Time: 29

Cont	Answ	Corr	t1	t2	t av
1	B	B	29	29	29.0
2	B	B			
3	B	B			
4	C	C			
5	A	B			
6	C	A			
7	A	A			
8	Z	Z			
9	A	A			

Chro 1 1 B B  
2 C C  
3 E E

**P.Correct:**7  
**P.Penalty:**0  
**Time (min.):**14  
**T.Chrono:**29  
**T.Penalty:**0

Extended ticket + correct, in vertical format for receipt printer and text-only version. For the neutralizations apply the same written in the previous paragraph.

## Answers table

Order#	Answer	Order#	t1	t2	t avg	Order#	Answer
1	B	1	19	19	19	1	A
2	Z						
3	B						
4	A						
5	D						
6	A						
7	Z						
8	A						
9	B						
10	Z						

It is the next large area of the screen corresponding to the general panel. In it, the answers given by the participant, the time invested in the timed controls groups and the responses in the timed controls can be written (or automatically annotated, as the case may be).

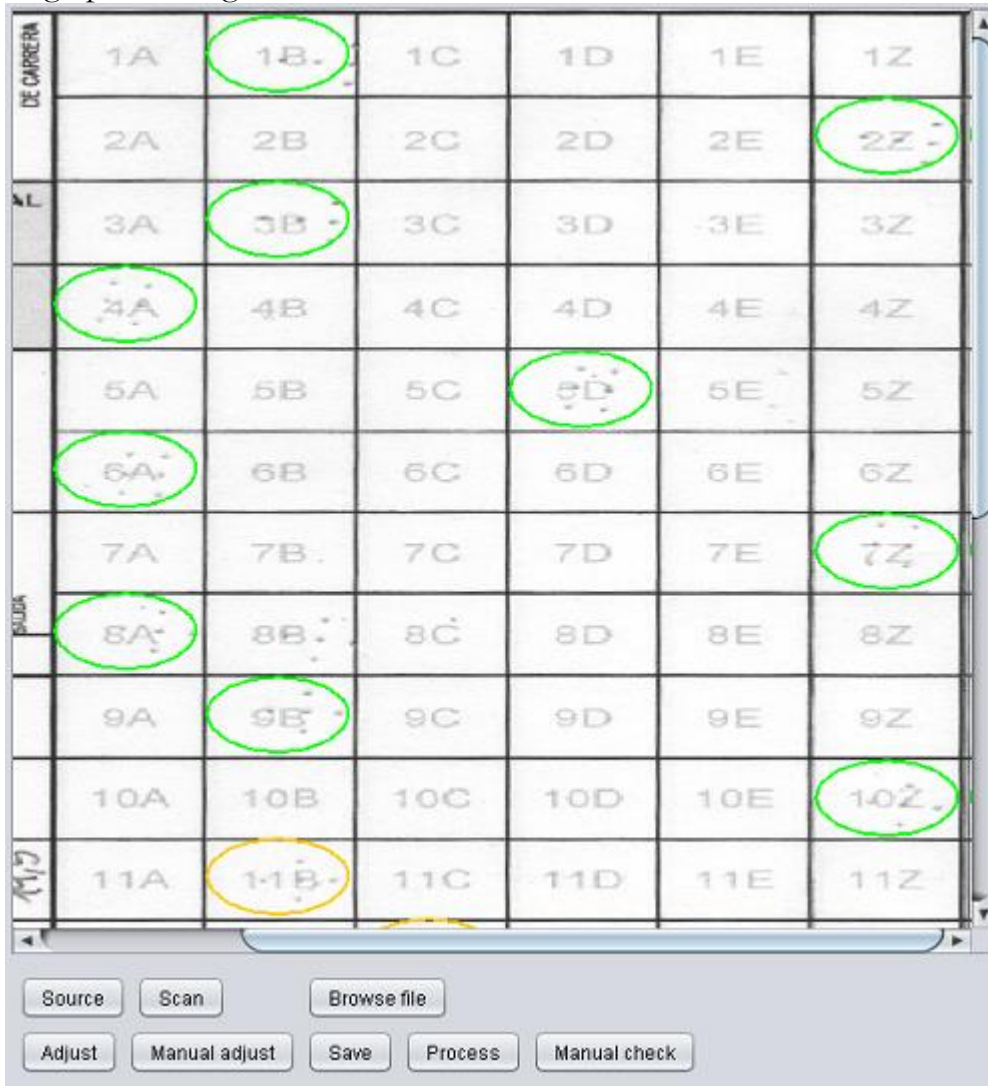
As for answers, you have to write the corresponding letter, in capital letters, following the order given when the controls were set in the configuration of the event.

As for times, it's in seconds. You can write the time of 2 timekeepers and the average of those 2 times.

If you have to write a decimal in the average, do it by separating with a period, for example "18.5".

The column in the middle (response times) changes depending on the configuration established for the type of timing (global to the group or individual for each control within the group). If the time is global to the group, there will be as many rows as groups and it will be necessary to write the time the participant took to answer, from the start and until the response to the last control of the corresponding group (if Sportident is used, it is already calculated automatically). On the contrary, if the timing is individual, there will be as many rows as timed controls. In each row you will have to write the time spent in responding to each control separately.

## Scanned image processing



Only in case you want to use the option to scan the manual response cards.

Buttons:

- Source. It serves to select the scanning device. You have to use devices that follow the TWAIN standard (Windows)
- Scan. Execute the process of scanning a document
- Browse file. Alternatively to direct scanning from the program, you can select an image file obtained by other means
- Adjust. It can easily happen that the scanned document is not perfectly framed. It is necessary that the document be limited to the area previously configured in the template (see chapter dedicated to the configuration of the template) and that it be straight. This adjustment process tries to recompose the scanned image to make it as straight as possible. These tasks can be very complicated and require a huge programming effort, so you may not get satisfactory results. To make this functionality viable, there is the following button
- Manual adjust. Pressing this button enters a process of adjustment by the operator. It involves clicking on 3 corners, top-left, bottom-left and bottom-right. This is enough to help the program make a correct adjustment

ORIENTACIÓN DE PRECISIÓN	NOMBRE Y APELLIDOS	FEDERACIÓN / CLUB	Nº DE DORSAL	CLASE	RESPUESTA		C.C.1	C.C.2	C.C.3	TIEMPOS DE ESPERA		HORA DE LLEGADA	PUNTO POR DE CARRERA	PUNTO POR CONTROLER CROMOMETR.	PENALIZACIÓN POR TIEMPO DE CARRERA			
					CRONO 1	CRONO 2				LEGDAN	LEGDAN					TOTAL TIEMPOS ESPERA	PENALIZACIÓN C.C.	
1A	1B	1C	1D	1E	1Z	A	19	B	C	1	2	5A	2A	2B	2C	2D	2E	2Z
2A	2B	2C	2D	2E	2Z	19	20					6A	3A	3B	3C	3D	3E	3Z
3A	3B	3C	3D	3E	3Z		1,5					7A	4A	4B	4C	4D	4E	4Z
4A	4B	4C	4D	4E	4Z							8A	5A	5B	5C	5D	5E	5Z
5A	5B	5C	5D	5E	5Z							9A	6A	6B	6C	6D	6E	6Z
6A	6B	6C	6D	6E	6Z							10A	7A	7B	7C	7D	7E	7Z
7A	7B	7C	7D	7E	7Z							11A	8A	8B	8C	8D	8E	8Z
8A	8B	8C	8D	8E	8Z							12A	9A	9B	9C	9D	9E	9Z
9A	9B	9C	9D	9E	9Z							13A	10A	10B	10C	10D	10E	10Z
10A	10B	10C	10D	10E	10Z							14A	11A	11B	11C	11D	11E	11Z
11A	11B	11C	11D	11E	11Z							15A	12A	12B	12C	12D	12E	12Z
12A	12B	12C	12D	12E	12Z							16A	13A	13B	13C	13D	13E	13Z
13A	13B	13C	13D	13E	13Z							17A	14A	14B	14C	14D	14E	14Z
14A	14B	14C	14D	14E	14Z							18A	15A	15B	15C	15D	15E	15Z
15A	15B	15C	15D	15E	15Z							19A	16A	16B	16C	16D	16E	16Z
16A	16B	16C	16D	16E	16Z							20A	17A	17B	17C	17D	17E	17Z
17A	17B	17C	17D	17E	17Z							18A	18A	18B	18C	18D	18E	18Z
18A	18B	18C	18D	18E	18Z							19A	19A	19B	19C	19D	19E	19Z
19A	19B	19C	19D	19E	19Z							20A	20A	20B	20C	20D	20E	20Z
20A	20B	20C	20D	20E	20Z													



ORIENTACIÓN DE PRECISIÓN	NOMBRE Y APELLIDOS	FEDERACIÓN / CLUB	Nº DE DORSAL	CLASE	RESPUESTA		C.C.1	C.C.2	C.C.3	TIEMPOS DE ESPERA		HORA DE LLEGADA	PUNTO POR DE CARRERA	PUNTO POR CONTROLER CROMOMETR.	PENALIZACIÓN POR TIEMPO DE CARRERA			
					CRONO 1	CRONO 2				LEGDAN	LEGDAN					TOTAL TIEMPOS ESPERA	PENALIZACIÓN C.C.	
1A	1B	1C	1D	1E	1Z	A	19	B	C	1	2	5A	2A	2B	2C	2D	2E	2Z
2A	2B	2C	2D	2E	2Z	19	20					6A	3A	3B	3C	3D	3E	3Z
3A	3B	3C	3D	3E	3Z		1,5					7A	4A	4B	4C	4D	4E	4Z
4A	4B	4C	4D	4E	4Z							8A	5A	5B	5C	5D	5E	5Z
5A	5B	5C	5D	5E	5Z							9A	6A	6B	6C	6D	6E	6Z
6A	6B	6C	6D	6E	6Z							10A	7A	7B	7C	7D	7E	7Z
7A	7B	7C	7D	7E	7Z							11A	8A	8B	8C	8D	8E	8Z
8A	8B	8C	8D	8E	8Z							12A	9A	9B	9C	9D	9E	9Z
9A	9B	9C	9D	9E	9Z							13A	10A	10B	10C	10D	10E	10Z
10A	10B	10C	10D	10E	10Z							14A	11A	11B	11C	11D	11E	11Z
11A	11B	11C	11D	11E	11Z							15A	12A	12B	12C	12D	12E	12Z
12A	12B	12C	12D	12E	12Z							16A	13A	13B	13C	13D	13E	13Z
13A	13B	13C	13D	13E	13Z							17A	14A	14B	14C	14D	14E	14Z
14A	14B	14C	14D	14E	14Z							18A	15A	15B	15C	15D	15E	15Z
15A	15B	15C	15D	15E	15Z							19A	16A	16B	16C	16D	16E	16Z
16A	16B	16C	16D	16E	16Z							20A	17A	17B	17C	17D	17E	17Z
17A	17B	17C	17D	17E	17Z							18A	18A	18B	18C	18D	18E	18Z
18A	18B	18C	18D	18E	18Z							19A	19A	19B	19C	19D	19E	19Z
19A	19B	19C	19D	19E	19Z							20A	20A	20B	20C	20D	20E	20Z
20A	20B	20C	20D	20E	20Z													

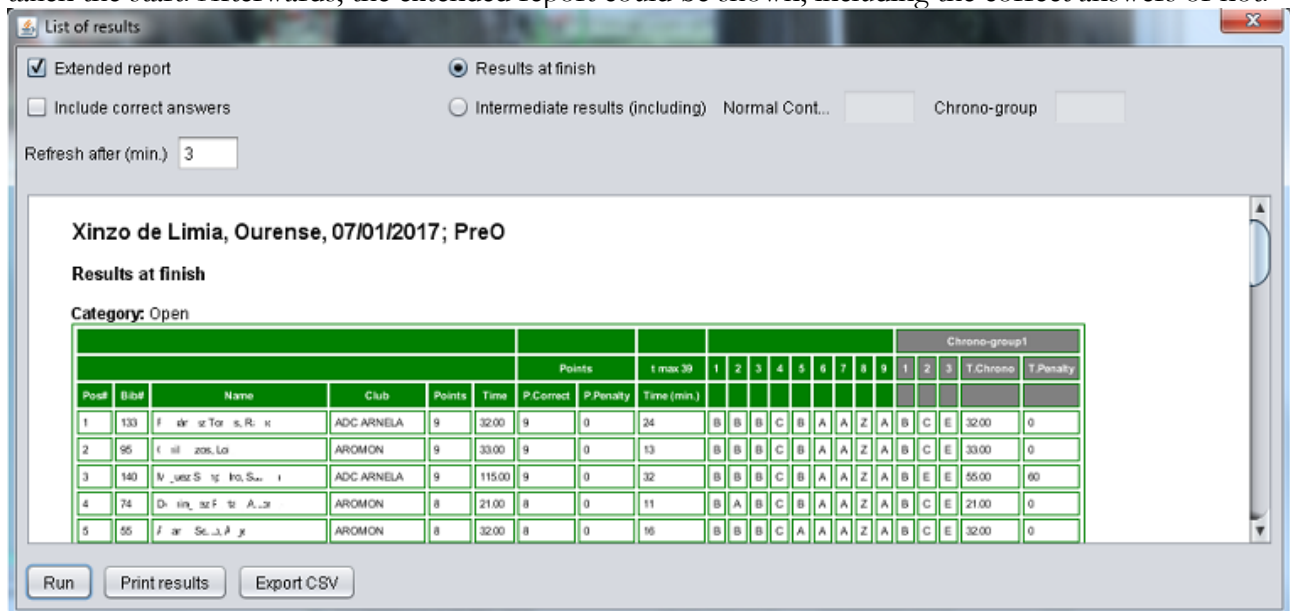
- Save. Stores the image file. It is stored in the answers folder of the active event, with a name that identifies the bib number of the participant as a name. This is done so that it can be automatically loaded the next time the participant is searched in the database
- Process. Launches a process of automatic search of answers. The program tries to recognize where there is a punching, comparing each box with the pattern automatically generated during the template configuration. It is possible that the participant was wrong, punching between 2 boxes, punching several times, not punching anything. Therefore, the process is not definitive and requires the intervention of the operator. The process draws a yellow circle where it thinks there is a mark
- Manual check / Stop. The button can toggle between these 2 values. Initially it says "Manual check". If pressed, the text changes to "Stop" and a process begins that pretends that the operator decides which are the valid answers. The operator clicks to confirm the answers, which causes a green circle to be drawn instead of the initial yellow circle. If, on the other hand, the operator wishes to discard any response (for example, because the participante punched 2 boxes), it is enough to click with the right button on the corresponding yellow circle, so that the answer is empty. When the "Stop" button is pressed again, the answers are automatically transferred to the table

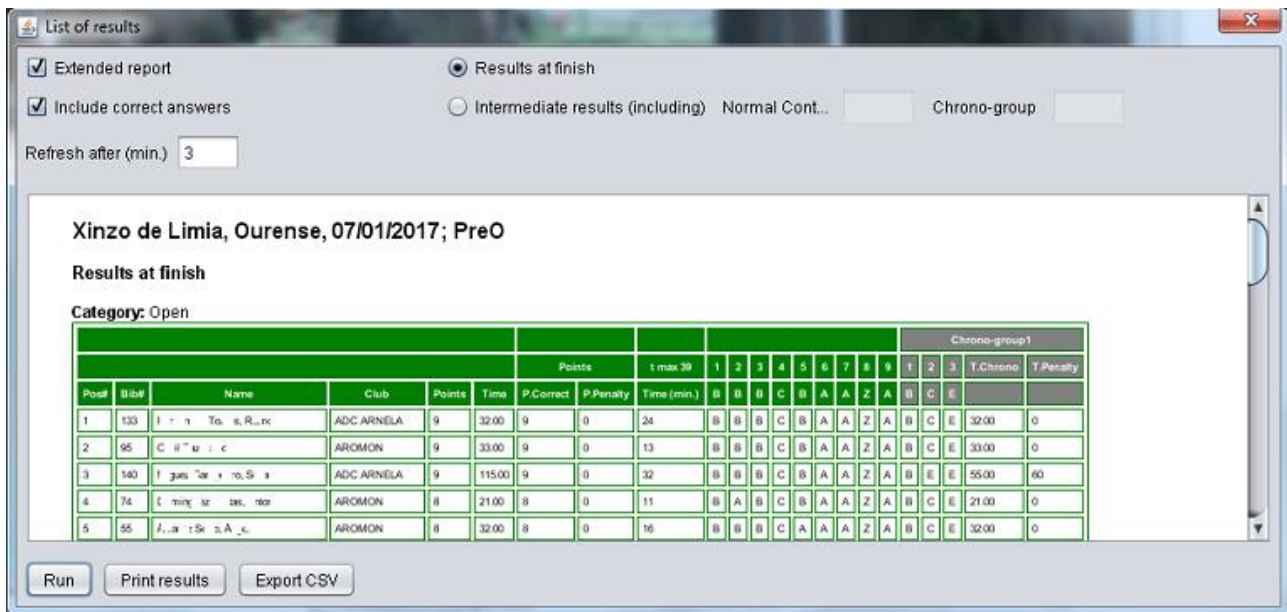
## Follow up. List of results

It is a screen that allows you to obtain a classification. Both this screen and the general panel are non-modal. This means that both can be run concurrently, so that we can make the follow-up of the event and maintain an updated list of classifications without the need for intervention by the operator.



When the “Run” button is pressed, a classification is made to show it on the screen. Initially, the report is simple (only points obtained and time of timed controls) and automatically refreshes after 3 minutes. You can modify the refresh interval, setting a value in minutes and restarting the list. You can check the boxes at the top to show the extended report (answers given by the participants) or even to add to the list the answers that are correct. This dynamism is useful to make the list evolve with the course of the race. You can show the simple report as long as there are participants that haven’t taken the start. Afterwards, the extended report could be shown, including the correct answers or not.





There are 2 additional buttons. One allows you to print the results sheet. The other allows you to obtain the results in CSV. The latter opens up the possibility that the organizer of the event customize the report, for example to publish it on the internet.

If the organization of the event has enough resources, there could be a second monitor or projector and show this screen on that separate device, so that the public can access the information without having to print reports in paper.

The program gives a more appropriate option to achieve the above. This screen generates an HTML file that really is the one that is displayed. The file could be opened in a browser to offer a better visualization. Moreover, thanks to the kindness of the Club Aromon de Pontevedra, an additional HTML file has been added that loads the results file and applies an automatic vertical scrolling. In this way, if the list is larger than the available vertical space, the public could see all the content without the intervention of an additional operator.

Having coverage in the place where the event takes place, the HTML file could be uploaded to the Internet so that the participants and the general public could consult the classifications practically in real time. This is not necessary to do it manually. Simply having configured the access to the remote server by FTP. This component of list of results performs the upload of the file every time it is updated, as long as the box has been checked to use the upload of files by FTP (in its configuration screen)

There are some additional parameters in the header of the screen that have not been explained yet. These are fields that allow you to toggle between a results view in finish line and a partial results view somewhere in between.



If there is no possibility of managing data at intermediate points, the initial selection should not be changed, to see the results at the finish line, that is, the classification of the participants that have taken the start, they have reached the finish and their results have been calculated.

However, if an intermediate control is carried out at one or more points, a list with the provisional intermediate classifications can be established at any of the points. For example, if you set a group of timed controls before the start, you could register the values in the group and show intermediate results containing only what has happened in the group of timed controls. Another example, if you set a person controlling halfway, say that in point 10, you could collect the data at that point and show an intermediate classification up to that point.

The value of the field "Normal control" indicates the control number to which you want to take into account to compose the partial classification (included). In the previous example, to see up to point 10 you would have to write that value in the field.

The value of the "Chrono-Group" field indicates the group number of timed controls (or station according to the regulations) that you want to take into account to compose the partial classification. In the previous example, we would be talking about a group of controls before the start, which would be number 1, a value that should be written in the field.

But how can data be collected? In 2 ways: manual or automatic. The automatic way is obviously through the use of Sportident. It is enough to download and send the card data to the remote server, as many times during the course as human and technical resources are available to us. See the corresponding appendix towards the end of the document.

The other mode of annotation of the data is manual. If we do not have sufficient resources or we do not manage Sportident for the management of answers and results, it could be done in a more traditional way. For example, the controlling person could take a photo of the participant's paper card and send it by some means (whatsapp, email) to the staff at the finish line. The person at finish could use the global panel (follow up) to record partial responses.

### Generation of graphism in the list of results

In the case of using graphism, an additional button is shown in order to generate it.

The screenshot shows the 'List of results' application window. A 'Category selection' dialog box is open, showing 'Open' selected in the 'Categories' dropdown and 'Pos# From 1 To 5' in the input fields. A red arrow points from the 'Graphism' button at the bottom of the main window to the dialog box. The main window also displays a table of results at the finish line.

Pos.	Bib#	Name	Club	Points	Chrono
1	600	[REDACTED]	LORCAO	14	90.00
2	2	[REDACTED]	AROMON	13	20.00
3	590	[REDACTED]	EL IMPERDIBLE	13	33.00
4	24	[REDACTED]	AROMON	13	35.00
5	20	[REDACTED]	AROMON	12	19.00

The user has to select a category and an interval of positions. Depending on the size of the canvas, the user will have to test the number of results that best fits on the image. The results shown are the same that appear in the current list of results, so they can be results at finish or provisional results at a given place of the course.



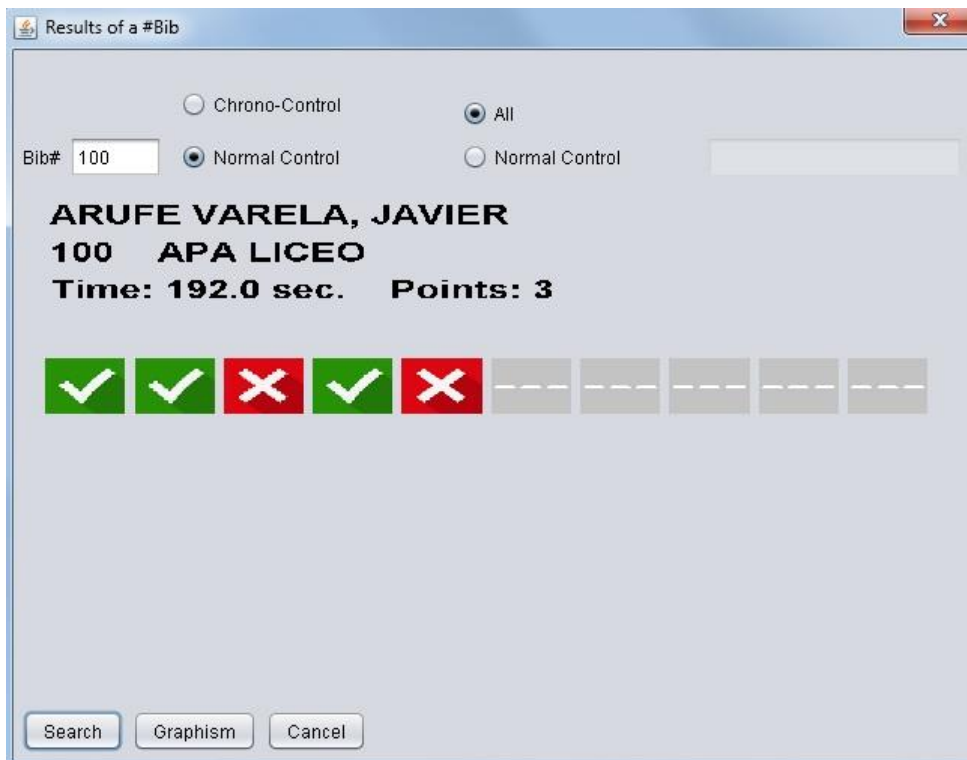
## Results of a bib number for grafism

It's an option specifically created to be used by an speaker or to be inserted on a live video streaming. The user writes the bib number of a participant and selects if he wants the results of normal controls or groups of timed controls. Then, a graphic is generated that contains the results up to that place.



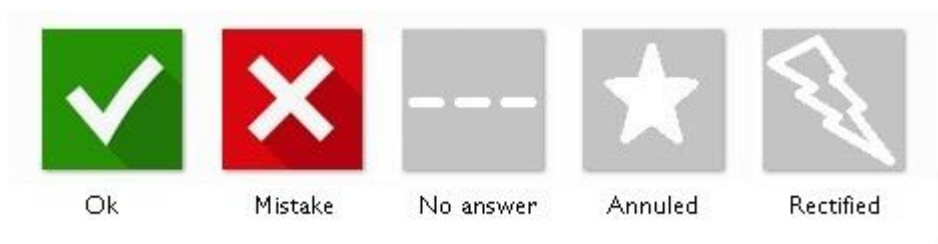
In the image, it appears the results on the groups of timed controls (there is only 1) for the bib number 100. The header shows the name, club and global results up to that moment.

Below that it would appear each group of timed controls. On the left side the identification and results of the group. On the right side the correct answers or mistakes of each control. The correct response is not shown, only the correctness. In the example you can see some numbers below each response. This is because the timing of the group was individual for each control in the group. The number represents the seconds that it took to give the answer (plus the penalty, if it existed)



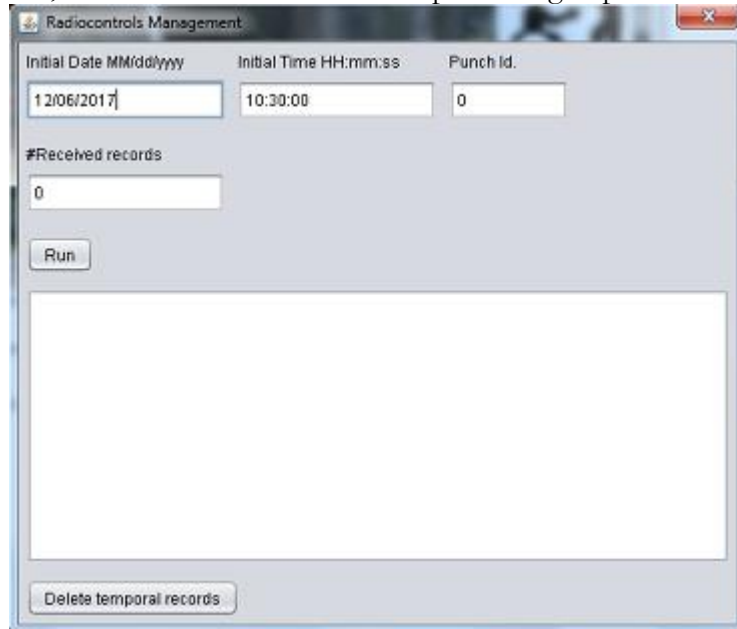
This other example shows the results on normal controls. The example represents a situation where the participant is on the field yet and he has passed an intermediate place on the course where a readout of the electronic card is done and the contents are sent through the use of a radiocontrol. That's why there are only correct answers and mistakes until a given place.

The meaning of the icons is the following:



## RX Radiocontrols

If intermediate data is sent through the CPI system, the punches can be collected and processed by executing another form continuously. As in the case of the global panel and the results list, this component is non-modal, which means that it can be kept running in parallel with the others.



The 3 fields at the top of the screen contain the remote server configuration values, those related to the data acquisition query. Pressing the “Run” button executes a separate process that is repeated periodically to obtain and process new data.

The raw data is displayed in the text area of the main part of the screen. The format of the data received is as follows:

Id; Station; SiCard; yyyy-MM-dd HH:mm:ss.SSS (punch); raw; yyyy-MM-dd HH:mm:ss (read)

The data indicating how many records have been received and the identifier of the last reading are updated automatically, so that the next query would start from the last received id.

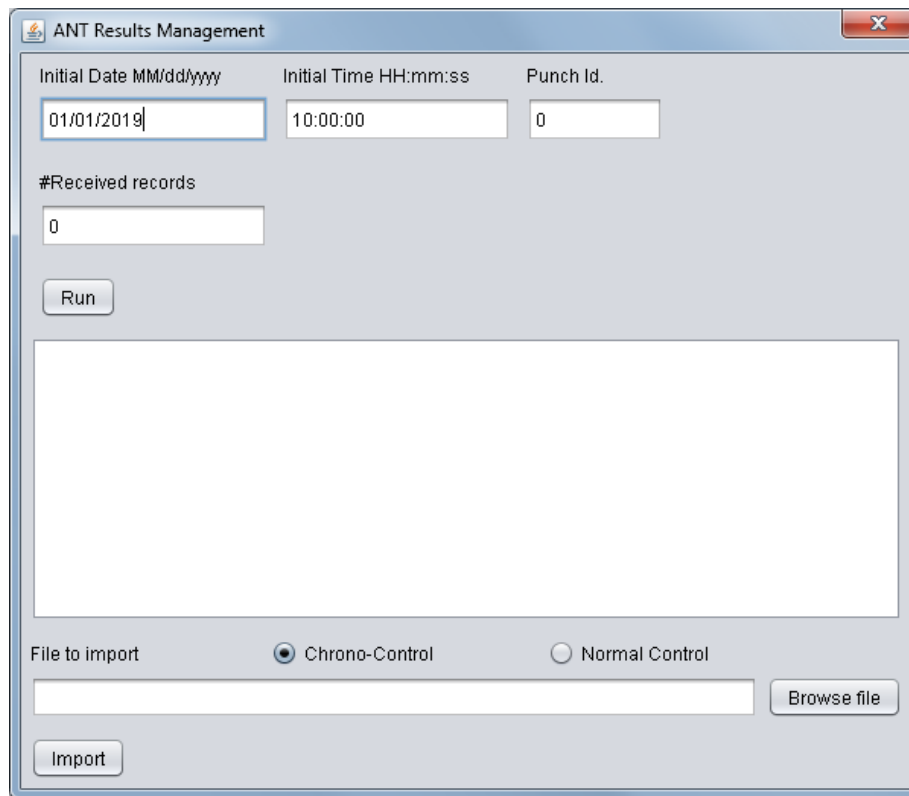
The button at the bottom serves to erase all temporary records downloaded from the remote server.

This can be useful for starting from scratch for intermediate data processing. The punch ID should be reset to 0 before starting again with the data download.

## RX Results from ANT

ANT has changed the results format several times. The last change has been made in versión 4.10.4. This program has been updated to accept all the formats. Last checked ANT versión is 4.11.1

If intermediate results are sent from ANT through the CPI system, the results can be collected and processed by executing another form continuously. As in the case of the global panel and the results list, this component is non-modal, which means that it can be kept running in parallel with the others.



The 3 fields at the top of the screen contain the remote server configuration values, those related to the data acquisition query. Pressing the “Run” button executes a separate process that is repeated periodically to obtain and process new data.

The raw data is displayed in the text area of the main part of the screen. The format of the data received is as follows:

Id; Type; yyyy/MM/dd HH:mm:ss; Bib#; Station; Name; Time; Answ1; ..; Answn; T1; ..; Tn;;

Id is the DB internal identifier for the results record.

Type identifies the results as for timed controls (0) or for normal controls (1)

The rest of fields is the original result sent by ANT: date/time of storing; bib number; group of controls (from 1 to n); name of the participant; total time in seconds; letters of all of the answers of the controls of the group (or the course in the case of normal controls); time in seconds to answer each individual control.

The data indicating how many records have been received and the identifier of the last reading are updated automatically, so that the next query would start from the last received id.

The button at the bottom serves to import files of results from ANT that have been transferred from the devices to the PC. This way, there is no need to configure the method of the remote server because the results can be imported locally. The method of the remote server is more interesting from the point of view that the results are immediately available, for example, for the publication of intermediate results. In this case, the user has to select the file and to tell the program if the file includes results from timed controls or normal controls.

## Follow up. Reprocess answers

Rewrite the responses of all the participants. When is it needed? When any configuration parameter of the event is changed (global timing start, linear check, possibility of rectification, etc). It only applies in the case that Sportident is being used.

This option, based on the new configuration, goes from participant to participant and rewrites the answer corresponding to each control, group and timed control.

Advice: in reality, the configuration parameters should not be changed during the execution of the event because it is something that has already had to be fixed before.

Advice: Any change that has been made manually in the follow-up screen will be undone if the answers are reprocessed. For example, if a participant has been disqualified, pressing this option will return to OK (or the state that corresponds to him). The same thing happens if you have changed by hand some time (for example, the Sportident station did not work and you had to write down the times by hand according to the manual timing of the support made by the organization staff)

## **Follow up. Recalculate results**

Recalculate the results of all the participants. When is it needed? When a challenge is annuled and when the previous option of reprocessing answers has been pressed. The screen that manages answers for a category is accessed and the necessary challenges are annuled. Then, this menu option is accessed and the program is responsible for calculating all the results without having to manually access each participant.

## **Follow up. Participant, delete results**

It is a process that was created to solve a problem that was not identified and that caused that in certain situations the values of answers of some participant were duplicated. The problem was already identified and resolved. This process has been left as waste. It could be useful at a given time to do pre-event testing.

The process erases only the answers written down for a participant. It does not erase the participant but only the answers given to the challenges and the timed controls. The operator must indicate the participant's bib number and the program is responsible for doing the rest.

## **List of missing runners**

It shows a table with the list of runners who are supposed to be still in competition, that is, they do not have a finish time. Nor have their status been changed to say that they did not start (DNS), that they are disqualified, etc.

## **List of runners DNS**

It shows a table with the list of runners who have been marked as not started (DNS). This control has to be done manually, for example from a list of starts on paper that is later taken into the program. Modifying the status to say "Did Not Start" is done on the Global Panel form.

## **Appendix. Configurations for management of timed groups**

### Case A. PreO, with unique timing for all the controls of the same group

This is the case currently used by FEDO in its competitions. As for the timed controls, you have to create one or several groups, create one or several controls and associate the controls to their corresponding group.

Maintenance → Events, PreO should be selected as the type of event

Maintenance → Categories, checkbox “Chrono-Group. Global Start - Stop” should be checked. To act as it is currently done in FEDO, you should also check the boxes corresponding to “no answer means error”

Maintenance → Chrono-Groups by category, time limit should be set (in FEDO there is currently a limit of 60 seconds) and no penalty (neither points nor time) if time limit on a group is exceeded (since a penalty will be established for each control)

Maintenance → Crono answers by category, you should set the options, the correct answer, 0 points for correct answer, 0 penalty points for incorrect answer and 60 seconds of penalty time for incorrect answer (or not answered)

### Case B. TempO, with unique timing for all the controls of the same group

It will be configured according to the IOF 2017 regulation.

Maintenance → Events, TempO should be selected as the type of event

There will be no normal controls

Maintenance → Categories, checkbox “Chrono-Group. Global Start - Stop” should be checked

Maintenance → Chrono-Groups by category, time limit should be 0 or an exaggeratedly high value (for example, 1800 seconds) and no penalty (neither points nor time) if time limit on a group is exceeded (since a penalty will be established for each control)

Maintenance → Crono answers by category, you should set the options, the correct answer, 0 points for correct answer, 0 penalty points for incorrect answer and 30 seconds of penalty time for incorrect answer (or not answered)

### Case C. PreO, with start and stop of the chrono for each control of the same group

It will be configured according to the IOF 2017 regulation. It differs from the one used by FEDO at the moment in the amount of time applied to the controls and, above all, in the way of counting the response time in each control of a timed group.

In reality there will be n groups and each one will include several controls.

Maintenance → Events, PreO should be selected as the type of event

Maintenance → Categories, checkbox “Chrono-Group. Global Start - Stop” should be unchecked

Maintenance → Chrono-Groups by category, you cannot set a time limit since it will be established for each control; nor penalization (neither points nor time) for excess time in the group (since a penalty will be established for each control)

Maintenance → Crono answers by category, you have to set the options, the correct answer, 0 points for a correct answer, 0 penalty points for an incorrect answer and 60 seconds as a penalty time for an incorrect answer, or not answered. In addition, the limit of 30 seconds is set to answer the control

It should be noted that the time t1 (the time it takes to give the answer) is always written, to which a t2 = 60 penalty is optionally added.

If the answer is correct, t total = t1.

If the answer is incorrect, t total = t1 + t2

If there is no answer; t total = t1 + 60, which is the same as the previous case, because t2=60

Regarding the final classifications, the program is prepared to perform a first descending order of points. Equal points perform an ascending order of time of the timed controls. The classification

system is valid for both PreO and TempO events since in the second case there will be no punctuation for correctly answered controls but only times. We see it:

In case A, the points assigned to the normal controls are summed up and the time in responding to the groups of timed controls plus time penalties due to errors in the timed controls is added.

In case B, in the absence of normal controls, all competitors will have 0 points. The time to respond to the timed controls groups is added plus the time penalties for errors in the timed controls.

In case C, it's the same as in case A with the only difference of computing the time required to respond to each timed control.

## Appendix. Diagram of sequence of punches according to the operating mode in groups of timed controls

### Case A. No stations are shared. Global timing to the group



1. The participant punches the start station. He now can look at the first window
2. The participant punches the station corresponding to the answer of the first control
3. The participant punches the station corresponding to the answer of the second control

\*For all cases to be the same in the reality, the organizer could make the participant to punch the start station after each answer, that is, start - pass the sheet to see the first window - answer - start - pass the sheet to see the second window – answer

\* The stop station is drawn with dashed line because it is not really forced to be used

Alternative method: timing first, then answer

1. The organizer punches at the start station. The participant can now look at the first window
2. The participant names or signals the answer of the first control
3. The participant names or signals the answer of the second control. Being the last control of the group, the organizer punches immediately the stop station. This ends the timing
4. The organizer punches the station corresponding to the answer of the first control
5. The organizer punches the station corresponding to the answer of the second control

### Case B. No stations are shared. Individual timing to each control of a group



1. The participant punches the start station. He now can look at the first window
2. The participant punches the station corresponding to the answer of the first control
3. The participant punches the start station. He now can look at the second window
4. The participant punches the station corresponding to the answer of the second control

Alternative method: timing first, then answer

1. The organizer punches at the start station. The participant can now look at the first window
2. The participant names or signals the answer of the first control. The organizer punches immediately the stop station. This ends the timing
3. The organizer punches the station corresponding to the answer of the first control
4. The organizer punches at the start station. The participant can now look at the second window
5. The participant names or signals the answer of the second control. The organizer punches immediately the stop station. This ends the timing
6. The organizer punches the station corresponding to the answer of the second control



### Case C. Stations are shared. Global timing to the group



1. The participant punches the start station. He now can look at the first window
2. The participant punches the station corresponding to the answer of the first control
3. The participant punches the start station. He now can look at the second window
4. The participant punches the station corresponding to the answer of the second control

Alternative method: timing first, then answer

1. The organizer punches at the start station. The participant can now look at the first window
2. The participant names or signals the answer of the first control
3. The participant names or signals the answer of the second control. Being the last control of the group, the organizer punches immediately the stop station. This ends the timing
4. The organizer punches the station corresponding to the answer of the first control
5. The organizer punches at the start station again. This doesn't imply the start of any new timing. It is done in order to separate the punches inside the memory of the card
6. The organizer punches the station corresponding to the answer of the second control

### Case D. Stations are shared. Individual timing to each control of a group



1. The participant punches the start station. He now can look at the first window
2. The participant punches the station corresponding to the answer of the first control
3. The participant punches the start station. He now can look at the second window
4. The participant punches the station corresponding to the answer of the second control

Alternative method: timing first, then answer

1. The organizer punches at the start station. The participant can now look at the first window
2. The participant names or signals the answer of the first control. The organizer punches immediately the stop station. This ends the timing
3. The organizer punches the station corresponding to the answer of the first control
4. The organizer punches at the start station. The participant can now look at the second window
5. The participant names or signals the answer of the second control. The organizer punches immediately the stop station. This ends the timing
6. The organizer punches the station corresponding to the answer of the second control

## Appendix. Example of real configuration. PreO.

In the following images you can see a real configuration for the following case:

- Competition in PreO modality
- 9 normal controls
- 1 group with 3 timed controls
- Points for correct answers (only for normal controls) = 1
- Limit of 39 minutes. 1 penalty point for each 5 minutes of excess
- Limit of 60 minutes before considering the participant as Out of time (“ot” in OE2010)
- Global timing for all the group, 1 measure for the 3 controls of the group
- In the group of timed controls there is a reuse of the Sportident stations (case C)
- 90 seconds to answer the timed controls of the group
- Penalty of 60 seconds for each timed control incorrect or not answered

Key	Short	Long	Grou...	Chro...	Contr...	Limit...	Point...	Pena...	Pena...	#Min...
1	Open	Open		1	3	9	39	1	0	1

Basic Extended

Key: 1  
Short: Open  
Long: Open  
Groups: 1  
Chrono: 3  
Controls: 9

New Delete Refresh Save

Basic Extended

Limit (min.): 39 Points correct: 1 Penalty points incorrect: 0 Penalty time incorrect: 0

Penalty points by block #Min. per block: 1 5 DSG Limit (min.): 60

Course, mandatory order  Share stations  
 Normal control. No answer means error  Chrono-Group. Global Start-Stop  
 Chrono control. No answer means error Rectifications: Get first answer

New Delete Refresh Save

Order#	Options	Correct	Void	SI A	SI B	SI C	SI D	SI E	SI F	SI Z	SI Sel.
1	A-D	B	<input type="checkbox"/>	32	34						
2	A-C	B	<input type="checkbox"/>	35	36	37					
3	A-B	B	<input type="checkbox"/>	38	39						
4	A-D	C	<input type="checkbox"/>	40	41	42	43				
5	A-C	B	<input type="checkbox"/>	44	45	46					
6	A-C	A	<input type="checkbox"/>	47	48	49					
7	A-B	A	<input type="checkbox"/>	50	51						
8	A-Z	Z	<input type="checkbox"/>	52							53
9	A-Z	A	<input type="checkbox"/>	54							55

Order#: 1  
Options: A-B  
Correct: B  
Void:   
SI A: 32 SI B: 34 SI C: SI D: SI E: SI F: SI Z: SI Sel.:

New Delete Refresh Save

Basic Extended

Order#: 1  
Description: Grupo 1  
limit (#sec): 90  
Penalty points exceeded: 0  
Penalty time exceeded: 0  
SIStation Start: 56  
SIStation Stop: 156  
SI A: 57 SI B: 58 SI C: 59 SI D: 60 SI E: 62 SI F: SI Z:

New Delete Refresh Save

Or...	Options	Co...	Void	Pol...	Pe...	Pa...	Chrono-group	SI A	SI B	SI C	SI D	SI E	SI F	SI Z
1	A-E	B	<input type="checkbox"/>	0	0	60	Grupo 1							
2	A-E	C	<input type="checkbox"/>	0	0	60	Grupo 1							
3	A-E	E	<input type="checkbox"/>	0	0	60	Grupo 1							

Basic Extended

Order#: 1  
Options: A-E  
Correct: B  
Chrono-gr...: Grupo 1  
Void:

New Delete Refresh Save

Basic Extended

Points correct: 0  
Penalty points incorrect: 0  
Penalty time incorrect: 60  
limit (#sec): 0  
SIStation Start: 0  
SIStation Stop: 0  
SI A: SI B: SI C: SI D: SI E: SI F: SI Z:

New Delete Refresh Save

## Appendix. Example of real configuration. Tempo.

In the following images you can see a real configuration for the following case:

- Competition in TempoO modality
- 0 normal controls
- 4 groups with 3 timed controls each = 12 timed controls
- No points are computed, only times
- Limit of 60 minutes
- Limit of 90 minutes before considering the participant as Out of time (“ot” in OE2010)
- Global timing for all the group, 1 measure for the 3 controls of the group
- In the group of timed controls there is a reuse of the Sportident stations (case C)
- 90 seconds to answer the timed controls of the group
- Penalty of 30 seconds for each timed control incorrect or not answered

Management of categories

Key	Short	Long	Grou...	Chro...	Contr...	Limit...	Point...	Pena...	Pena...	#Min...
1	Open	Open	4	12	0	60	0	0	0	5

Basic Extended

Key: 1  
 Short: Open  
 Long: Open  
 Groups: 4  
 Chrono: 12  
 Controls: 0

New Delete Refresh Save

Management of categories

Basic Extended

Limit (min): 60 Points correct: 0 Penalty points incorrect: 0 Penalty time incorrect: 0

Penalty points by block: 0 #Min. per block: 5 DSQ Limit (min): 90

Course, mandatory order  Share stations  
 Normal control. No answer means error  Chrono-Group. Global Start-Stop  
 Chrono control. No answer means error Rectifications: Get first answer

New Delete Refresh Save

Management of questions

Order#	Options	Correct	Void	SI A	SI B	SI C	SI D	SI E	SI F	SI Z	SI Sel.
Order#	Options	Correct	Void	SI A	SI B	SI C	SI D	SI E	SI F	SI Z	SI Sel.

Order# null  
 Options null  
 Correct null  
 Void   
 SI A null SI B null SI C null SI D null SI E null SI F null SI Z null  
 SI Sel. null

New Delete Refresh Save

Management of chrono-groups

Order#	Description	limit (#sec)	Penalty point	Penalty time	SIStation Start	SIStation Stop
1	Grupo 1	90	0	0	31	0
2	Grupo 2	90	0	0	39	0
3	Grupo 3	90	0	0	46	0
4	Grupo 4	90	0	0	53	0

Order# 1  
 Description: Grupo 1  
 limit (#sec): 90  
 Penalty points exceeded: 0  
 Penalty time exceeded: 0  
 SIStation Start: 31  
 SIStation Stop: 0  
 SI A 32 SI B 33 SI C 34 SI D 35 SI E 38 SI F SI Z

New Delete Refresh Save

Management of chrono-questions

Or.	Options	Co.	Void	Pol.	Pe.	Pe.	Chrono-group	SI A	SI B	SI C	SI D	SI E	SI F	SI Z
1	A-E	B	<input type="checkbox"/>	0	0	30	Grupo 1							
2	A-E	E	<input type="checkbox"/>	0	0	30	Grupo 1							
3	A-E	C	<input type="checkbox"/>	0	0	30	Grupo 1							
4	A-E	B	<input type="checkbox"/>	0	0	30	Grupo 2							
5	A-E	E	<input type="checkbox"/>	0	0	30	Grupo 2							
6	A-E	C	<input type="checkbox"/>	0	0	30	Grupo 2							
7	A-E	D	<input type="checkbox"/>	0	0	30	Grupo 3							
8	A-E	C	<input type="checkbox"/>	0	0	30	Grupo 3							
9	A-E	B	<input type="checkbox"/>	0	0	30	Grupo 3							
10	A-E	D	<input type="checkbox"/>	0	0	30	Grupo 4							

Basic Extended

Order# 1  
 Options A-E  
 Correct B  
 Chrono-gr... Grupo 1  
 Void

New Delete Refresh Save

Management of chrono-questions

Basic Extended

Points correct: 0  
 Penalty points incorrect: 0  
 Penalty time incorrect: 30  
 limit (#sec):  
 SIStation Start:  
 SIStation Stop:  
 SI A SI B SI C SI D SI E SI F SI Z

New Delete Refresh Save

## Appendix. Example of real configuration. Sprint.

A Sprint competition is that in which timed stations are not used to break the tie, but the actual race time is used. Thanks to the program's parameterization possibilities, solutions can be found to manage this type of event.

The program does not use the race time to conform the results. You can configure an event in the PreO style, adding a "fictitious" timed station, that is, one that does not reward or penalize but in which we store the race time. To be able to do so, it is necessary to establish as start and stop stations (for the fictitious group) the same as the start and finish stations.

The following list shows a possible configuration, used in a real competition:

- Events management form:
  - o Type Sprint
  - o Start, normal control: 31
  - o Finish, normal control: 32
- Categories management, tab "Basic":
  - o Groups: 1 (a fictitious timed control group is created)
  - o Timed: 1 (the fictitious group has only one control, fictitious too)
  - o Controls: 22 (put the number of normal controls)
- Categories management, tab "Extended":
  - o Limit (min): 60; Points correct: 1; Penalty points: 0; Penalty time: 0; Penalty points by block: 1; Minutes x block: 5; DSQ Limit: 90
  - o Check boxes at the bottom, mark as appropriate. Check "Share stations" and "Timed-group. Global Start-Stop"
- Answers by category:
  - o In a Sprint competition, the controls are usually of the A-Z type.
  - o Options: A
  - o Correct: (write the corresponding letter, A or Z)
- Timed groups by category:
  - o 1 record only, for one fictitious group
  - o Order#: 1
  - o Description: Gr. 1
  - o Limit: a very high value that suffices for the maximum time, eg., 14400 → 4h
  - o Penalty points exceeded: 0
  - o Penalty time exceeded: 0 (the penalty is in the category block)
  - o SiStation Start: 31 → The same as the Start Station
  - o SiStation Stop: 32 → The same as the Finish Station
- Timed answers by category, tab "Basic":
  - o 1 record only, for one fictitious control
  - o Order#: 1
  - o Options: A
  - o Correct: A (it does not matter what we put, since it is fictitious and will not be verified)
  - o Timed Gr.: Gr. 1
- Timed answers by category, tab "Extended":
  - o Points correct: 0
  - o Penalty points incorrect: 0
  - o Penalty time incorrect: 0

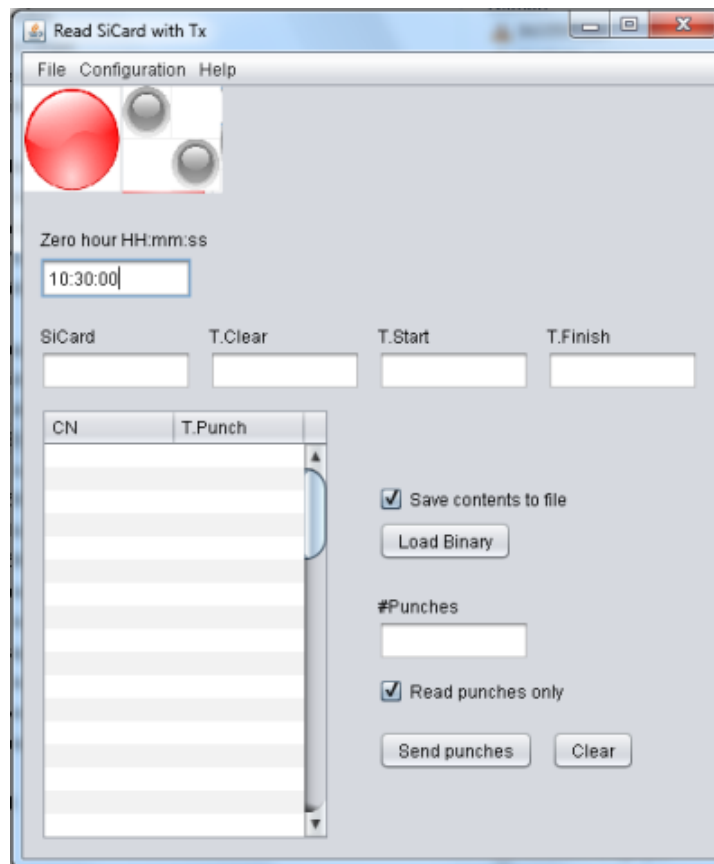
## Appendix. Module for downloading and sending intermediate punches

This appendix shows the independent component that allows the download of Sportident cards and the sending of the punches to the remote server of intermediate points control (CPI) in a format understandable by that system.

The fact that it is independent means that it can be used both for the management of Trail-O and for any other subsequent project.

The readings sent to the server are those that can be collected from the main module to process and show provisional classifications at intermediate points.

It has a main form and its own menu that allows you to perform configuration tasks. The configuration consists in the selection of language, data of the serial port (for the download of contents of the cards using a readout station) and data of the access to the remote server for the storage of the punches, which are the same forms as for the Trail-O main management component.



The upper part contains the management panel of the readout station. In red indicates that you have not connected to a station. In green the connection is made. When data is read from a card, the small gray LEDs flash and a sound is also heard.

Zero hour is used only for Si5 cards, since they only store information in a 12h format. Therefore, if the time that arrives is less than the zero hour, the program will add 12h to the value that will be displayed on the screen. For the other cards there is a bit that indicates if it is an AM or PM time so this zero time is not taken into account.

When a card is read, the fields and the table with the reading values are automatically filled. If the configuration establishes that subsecond values are used, the Start and Finish time fields add that sub-classification to the value.

All data can be modified by hand to alter the desired value. This allows manual testing and transmission easily.

Save / Load binary. The readings can be recorded in binary files (each card is a file with the name of its identification number and the extension .bin). This allows you to load the stored data later or simply to backup the readings.

The "read punches only" checkbox allows you to speed up the reading process, dedicating itself exclusively to the blocks that contain punching data. In any case, this screen does not currently show any additional data.

The button to "send punches" sends the content on screen in the form of punches to the intermediate points control server. There must be a Sportident card number and only fields with value are sent. In addition, in the configuration of the server you can decide if you want to send the time of start and finish time, because depending on the practical application may not be necessary. In the case of Trail-O management, the module that recalculates intermediate results will not take this information into account.

The form has its own thread of execution which is listening to the server's response. When it arrives, an OK message is displayed with the number of records received by the server. It may happen that the connection is not established. As this is managed by the external thread to this component, it is not possible to know if there was a connection error than by consulting the java console.

**IMPORTANT NOTE:** Currently, it is no longer necessary to use this module to upload the readings of a Sportident card. You can use the apk for Android Smartphone (version  $\geq 8$ , Oreo) of the CPI radiocontrol system, since the latest version allows the connection of a readout station to the Smartphone to read and send the full contents of a Sportident card. See the information of the CPI radiocontrol system at <http://jaruori.es/minintro.jsp?cLang=en>

## Appendix. Calculation of the neutralizations.

Functionality to apply one or several neutralizations during a course. The design of the idea is kept as simple as possible to avoid complex managements.

At event level, 2 fields are added to set a neutralization start station and a neutralization finish station. If during the course more neutralizations have to be applied, then more stations will have to be configured with the same codes for start and end.

When calculating the results, all occurrences of start and finish of neutralization are searched in order to calculate the time spent (in minutes), with the following particularities:

- If after a start there are more start times saved in the memory of the card consecutively, the program keeps the first starting time
- If after a finish there are more finish times saved consecutively, the program keeps the last finish time
- All intervals are calculated using hour-minute-seconds and they are added in order to obtain a global neutralization time
- The result is converted into minutes and rounded to the next integer value (0'30" → 1'; 5'54" → 6; 7'12" → 8) The idea is to not prejudicate the runner by using more common roundings that will discard fractions of a minute in some cases; that's why we always take the next integer above
- If the sequence of stations result in an odd set, having start stations without end or having an end without a start, the calculation returns -1 indicating that there were an error. The program will show a message for the user to check neutralizations manually

In the answers readout form 2 fields have been added to the existing ones used to store the start time, finish time and race time (in minutes). The new ones are those of neutralization time and total time, expressed in minutes too. The neutralization time is the sum of all of the neutralizations found in the electronic card. Total time is equal to race time – neutralization time. When clicking the "Calculate" button, the program performs the calculation of times and also of points.

Next is an example of how it works. The example includes the sequence of stations and times stored in a card. Some variants are added in order to explain different situations:

112 (Start) – 11:30:00

32 – 11:30:10

38 – 11:30:20

43 – 11:30:30

231 (Neutralization Start) – 11:30:40

106 (Chrono-group Start) – 11:30:50

107 (Chrono-group Stop) – 11:31:00 (10" + 1 mistake = 60" → 70")

104 – 11:31:01

106 – 11:31:02

103 – 11:31:03

106 – 11:31:04

103 – 11:31:05

106 – 11:31:06

232 (Neutralization End) – 11:34:00 (200" → 3'20" → 4' as neutralization time in minutes)

46 – 11:34:10

49 – 11:34:20

52 – 11:34:30

Finish – 11:40:50 (650" → 10'50" → 10' as race time)

Some variants and results:

112, 32, 38, 43, 231, 231 (11:30:41), 106, ... → the result is the same as above, given a second start immediately after the first one; the first is taken

112, 32, 38, 43, 231, 106, 231 (11:30:51), 107 → error to have and start without an end, or 2 starts with some other punches in between, depending on how you look at the punches

112, 32, 38, 43, 231 (11:30:40), 106, 107, ..., 232 (11:34:00), 232 (11:38:00), ... → neutralization = 8'

112, 32, ..., 231, ..., 232, 46, 231 (11:34:11), 49, 52 → error to have a start without an end

112, 32, ..., 46, 232 (11:34:11), 41, 52 → error to have an end without a start

112, 32, ..., 231 (11:30:40), ..., 232 (11:34:00), 46, 231 (11:38:00), 232 (11:41:05), 49, 52 → 3'20" of the first neutralization + 3'05" of the second = 6'25" → 7' as the total neutralization

ID	785	APA LICEO	6	0.00	6	0	59	0	59	A	B	B	A	C	B	B	C	A	C
6	804	APA_LICEO	6	0.00	6	0	59	0	59	A	B	B	A	C	B	B	C	A	C
8	778	Independiente 5	5	0.00	5	0	19	0	19	D	B	A	A	A	B	C	C	A	B
8	788	BRIGANTIA	5	0.00	5	0	40	0	40	A	B	B	C	C	C	B	C	C	A
8	755	Independiente 5	5	0.00	5	0	55	0	55	B	B	B	A	B	B	B	A	B	B
8	797	APA_LICEO	5	0.00	5	0	59	0	59	C	B	B	A	C	B	B	A	C	C
12	777	Independiente 4	4	0.00	4	0	19	0	19	D	B	A	A	A	B	B	C	C	B
12	793	USC	4	0.00	4	0	44	0	44	A	B	A	C	B	B	C	C	A	C
12	756	Independiente 4	4	0.00	4	0	55	0	55	B	B	B	A	A	B	B	B	B	B
15	767	Independiente 3	3	0.00	3	0	35	0	35	C	B	B	A	C	B	B	C	A	A
										40%	100%	80%	80%	53%	33%	53%	6%	66%	66%

Category: Open

Pos#	Bib#	Name	Club	Points	Time	P.Correct	P.Penalty	T.Race (min.)	T.Neutr.	T.Total	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20																				Chrono group					
											B	C	Z	X	Z	X	B	C	Z	B	B	Z	Z	A	A	B	A	Z	D	D	B	C	T.Chrono	T.Penalty		
1	600		LORCA-O	14	90.00	14	0	56	0	56	B	C	Z	B	Z	Z	B	B	C	Z	B	B	Z	Z	A	A	B	A	Z	D	D	C	C	30.00	60	
2	2		AROMON	13	20.00	13	0	89	0	89	B	C	Z	B	Z	Z	A	B	Z	Z	B	B	Z	Z	A	A	B	A	Z	D	D	B	C	20.00	0	
3	590		EL IMPERDIBLE	13	33.00	13	0	79	0	79	B	C	Z	B	Z	Z	A	B	Z	Z	B	B	Z	Z	A	A	B	A	Z	D	D	B	C	33.00	0	
4	24		AROMON	13	35.00	13	0	93	0	93	B	C	Z	Z	Z	Z	Z	B	Z	Z	B	B	A	A	Z	B	A	Z	D	D	B	C	35.00	0		
5	20		AROMON	12	19.00	12	0	70	0	70	B	C	Z	B	Z	Z	A	B	Z	Z	B	B	Z	Z	A	A	B	A	Z	D	D	B	C	19.00	0	
6	188		ADC_ARNELA	12	23.00	12	0	78	0	78	B	C	Z	B	A	A	A	B	C	Z	B	B	A	Z	A	A	B	A	Z	D	D	B	C	23.00	0	
7	230		TREVINCA	12	35.00	12	0	92	0	92	B	C	Z	B	Z	Z	A	B	Z	Z	B	B	Z	Z	A	A	B	A	Z	D	D	B	C	35.00	0	
8	51		AROMON	12	50.00	12	0	99	0	99	B	C	Z	C	Z	A	A	B	B	Z	Z	B	B	Z	Z	A	A	B	A	Z	D	D	B	C	50.00	0
9	348		ARTABROS	12	91.00	12	0	56	0	56	B	C	Z	Y	Z	A	A	B	C	Z	B	B	Z	Z	A	A	B	B	Z	D	D	C	B	31.00	60	
10	510		COMA	11	32.00	11	0	83	0	83	B	C	Z	C	Z	A	A	B	Z	Z	B	B	Z	Z	A	A	B	Z	D	D	B	C	32.00	0		
11	591		IO CIUDAD REAL	11	218.00	11	0	92	0	92	B	C	Z	B	Z	Z	A	B	Z	Z	B	B	Z	Z	A	A	A	Z	D	D	B	C	31.00	180		
12	522		TOLEDO-O	10	31.00	10	0	52	0	52	B	C	A	C	Z	A	B	Z	Z	A	Z	B	B	Z	A	A	Z	D	D	B	C	31.00	0			
13	3		AROMON	10	38.00	10	0	86	0	86	B	C	Z	B	Z	Z	A	A	C	B	Z	B	Z	Z	A	A	B	A	Z	D	D	B	C	38.00	0	
14	603		COMA	10	81.00	10	0	81	0	81	B	C	Z	B	A	B	B	B	Z	Z	B	B	Z	Z	A	A	B	B	Z	D	D	B	C	81.00	0	
15	508		ADOL	10	97.00	10	0	90	0	90	B	C	Z	C	Z	A	B	B	C	Z	A	Z	Z	Z	A	A	B	B	Z	D	D	C	37.00	60		
16	290		BRIGANTIA	10	103.00	10	0	84	0	84	B	D	Z	C	Z	B	B	B	Z	Z	B	B	Z	Z	A	A	Z	D	D	C	43.00	60				
17	542		A PEDROSA_ORRO	9	24.00	9	0	47	0	47	B	C	Z	B	A	A	B	B	Z	Z	B	B	Z	Z	A	Z	B	A	B	C	D	B	C	24.00	0	
18	494		IES_SABON	9	30.00	9	0	87	0	87	B	C	Z	B	Z	Z	A	B	B	Z	B	B	Z	Z	A	A	Y	A	B	D	D	B	C	30.00	0	
19	360		ARTABROS	9	56.00	11	2	110	0	110	B	C	Z	C	Z	A	A	Z	C	Z	B	Z	Z	A	Z	A	Z	B	A	Z	D	D	B	C	56.00	0
20	23		AROMON	9	197.00	9	0	74	0	74	B	C	Z	B	Z	Z	A	B	Z	Z	B	B	Z	Z	A	A	B	B	D	D	D	E	77.00	120		
21	43		AROMON	8	79.00	8	0	87	0	87	B	A	Z	C	Z	A	B	B	B	B	Z	Z	Z	A	A	Z	B	A	B	D	D	B	C	79.00	0	
22	393		MONTANA_FERROL	8	83.00	8	0	49	0	49	B	C	B	B	Z	Z	Z	Z	A	Z	B	C	Z	Z	A	A	C	A	B	D	D	B	C	23.00	60	
23	535		BG	8	170.00	8	0	53	0	53	B	B	A	B	Z	B	A	C	Z	Z	B	B	Z	Z	A	A	B	A	B	D	D	C	B	E	50.00	120
24	222		ADC_ARNELA	7	82.00	7	0	78	0	78	Z	C	B	B	Z	Z	A	B	Z	Z	B	B	A	Z	A	A	B	C	Z	D	D	B	C	82.00	0	
25	44		AROMON	7	95.00	7	0	46	0	46	B	C	Z	B	A	A	B	B	C	C	B	B	Z	Z	A	A	C	B	A	C	D	D	C	35.00	60	
26	45		AROMON	7	214.00	7	0	83	0	83	X	Y	B	B	Z	B	A	B	C	B	B	B	Z	Z	A	A	Z	B	A	B	C	E	C	B	34.00	180
27	296		BRIGANTIA	6	30.00	6	0	47	0	47	B	C	Z	B	A	A	B	B	A	B	Z	B	A	Z	Z	A	A	B	B	Y	D	B	C	30.00	0	
28	355		ARTABROS	6	149.00	6	0	55	0	55	B	C	Z	B	Z	A	B	Z	B	C	B	B	Z	Z	A	A	C	B	A	B	D	D	C	B	29.00	120
29	273		APA_LICEO	5	55.00	5	0	59	0	59	A	C	B	B	Z	Z	B	C	B	C	B	A	A	A	Z	A	C	B	D	D	B	C	55.00	0		
30	990		APA_LICEO	5	70.00	5	0	10	4	6	B	C	Z	C	Z	X	X	X	X	X	X	X	X	X	X	X	X	X	X	D	D	C	10.00	60		
31	37		AROMON	5	89.00	5	0	67	0	67	B	C	Z	C	A	B	B	Z	Z	A	B	A	B	Z	Z	A	A	B	B	D	D	C	29.00	60		
32	530		BG	5	113.00	5	0	50	0	50	D	Z	A	B	A	B	B	C	B	B	Z	Z	A	Z	A	C	A	B	D	D	C	53.00	60			
33	295		BRIGANTIA	5	143.00	5	0	54	0	54	A	Y	Z	B	Z	A	A	Z	A	B	A	B	Z	Z	A	A	B	B	D	D	C	83.00	60			
34	269		APA_LICEO	5	185.00	5	0	43	0	43	A	C	B	B	Z	A	B	B	C	B	B	A	A	Z	A	C	A	B	D	D	C	B	65.00	120		
35	649		GALLAECIA_RAID	4	199.00	4	0	38	0	38	A	C	B	B	A	B	B	A	C	B	A	B	Z	Z	A	A	B	C	A	B	C	A	B	19.00	180	
36	234		TREVINCA	3	218.00	3	0	63	0	63	A	C	A	B	A	A	A	A	B	C	Z	B	A	A	Z	Z	B	A	D	D	C	E	D	38.00	180	
37	144		GALLAECIA_RAID	2	95.00	2	0	61	0	61	Z	Y	A	B	A	A	B	A	Y	B	B	B	Z	A	Z	A	C	A	D	D	A	C	35.00	60		
											75%	78%	70%	0%	72%	18%	0%	56%	24%	56%	78%	81%	0%	0%	0%	0%	62%	62%	45%	78%	81%	56%	78%			

Picture of the results list with the columns about the neutralization time and total time, at the right of the race time column. All are expressed in minutes.



## Appendix. Using “Remote DB” (TCP) Remote Server

This remote server allows the use of several computers (slaves or clients) connected to the same database (master or server) with the aim of distributing tasks among several users. Most events can be managed with a single user operating the main computer. For larger events or those that require greater attention to certain functions (radio controls, generation of results, graphics for Streaming, etc.), a connection can be made between several PCs, dedicating each PC to one of the tasks.

The master contains the database with the event to be managed. This computer runs the application in the usual way to connect locally to its BD. But you also have to start the DB manager in server mode to allow other users to connect.

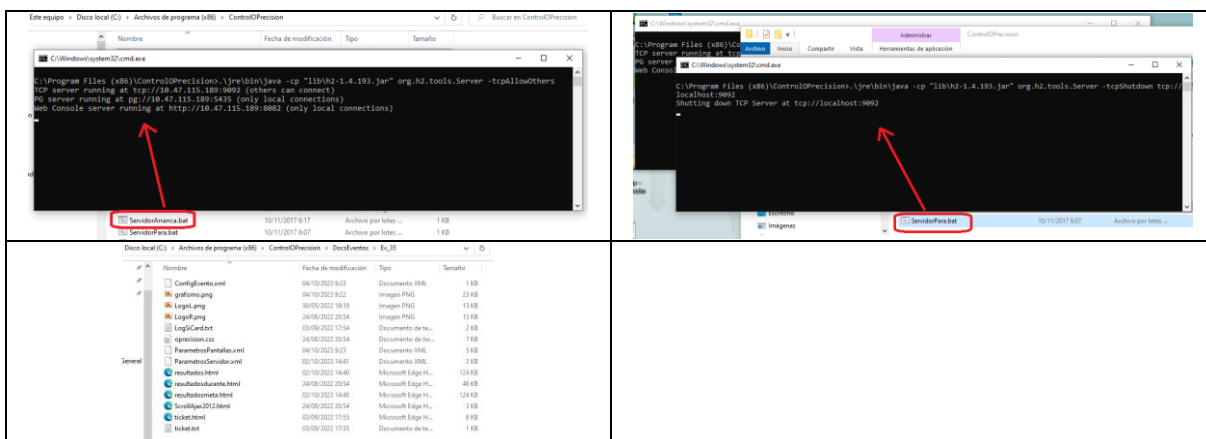
The slave configures the remote access data and checks the box to say that it will use remote access. From that moment, the connection will be made to the DB on the master's machine. You will be able to view the list of events, you will be able to configure one of the events as the active event, and you will be able to handle all the configuration and tracking functions of the event.

### Steps to perform in the master:

- 1.- Use the application in the conventional way to manage the event locally. No need to change anything in the program settings on the master
- 2.- Start the DB manager in server mode to enable remote connections. To do this, run the file “ServidorArranca.bat”, which is located in the program installation folder.
- 3.- When you no longer want to share the connection with other slaves, stop the DB manager in server mode. To do this, run the file “ServidorPara.bat”

### Steps to perform on the slave:

- 1.- Even if the slave already has the software installed locally, it may be better to perform a new installation in another folder to act as a slave. This is because the slave connects to the master's DB, but the files that are generated and used during event management are saved on the slave itself (logos for results, HTML for results, images for graphics). In addition, this way you can also have a personalized configuration without interfering with that of the master (use of radio controls, FTP, etc.)
- 2.- Launch the application
- 3.- In Configuration → Remote Servers → Remote Database, write the PC name of the master and check the box to use the remote server. Accept and File → Save Settings
- 4.- From that moment, the slave will be connecting to the master's DB. In Configuration → Event, select the event you want to manage. In Configuration → Serial Port, configure the port for Sportident download. In Configuration → Remote Servers, configure the necessary functions (radio controls, ANT, etc.)



# Appendix. HTML Results File. Inner identifiers and style

The file "resultados.html" is generated from the window "Follow up → List of results. It has an associated style definition file "oprecision.css" from which you can customize the appearance of some of the elements. A design of a few classes has been made (class attribute of html elements):

- cabecera1. Appearance of the logos and description of the event at the top of the page
- listpeque. Each of the cells in the results tables
- listpeque\_error. Cells corresponding to incorrect answers
- thgrupo. Header cells of the results tables, of the timed controls
- tdgrupo. Cells of the rows of the results tables, of the timed controls

Additionally, unique identifiers (id attribute) have been added to all elements of the results HTML file. This enables further processing of the results. An example could be creating a query page that allows you to search for a bib number and displays only the subset of data that corresponds to that number, hiding the rest of the data. Another example could be the automatic extraction and processing of data from an external program.

The image shows a screenshot of the HTML results file for the event "Castro de Viladonga 2022, 03/09/2022; Sprint". The page header includes the event name, date, and logos for "ORIENTACION LICEO" and "ORIENTERING". Below the header is a "Resultados en meta" section with a "Gestión de categorías" dropdown menu showing "Open" selected. The main content is a results table with columns for "Posición Dorsal", "Nombre", "Club", "Puntos", "Tiempo", "P. Correcto", "P. Penalización", "T. Carrera (min.)", "N. Muñt.", "T. Total", and "Gr. Cronof.". The table lists two participants: dorsal 12 (club TREVINICA) and dorsal 143 (club ADC\_ARNELA). Below the table is a large block of HTML code with various class and id attributes. Red arrows point from the table to the corresponding HTML elements in the code, such as the table header, the table body, and the category dropdown. The code includes numerous class names like "cabecera1", "listpeque", "thgrupo", and "tdgrupo", as well as unique identifiers for each element.

## Appendix. Using FTP Remote Server to upload results

Through FTP you can upload different files to a remote server. The main use is for the publication of real-time results. Another use is, by third parties, to collect data in text format, process them and use them, for example to perform an audiovisual production.

Files to upload:

- resultados.html, resultadosdurante.html, resultadosmeta.html, resultadosgruponn.html (nn being the number of a group of timed controls)
  - o Whenever results are generated, resultados.html file is created
  - o If the results are at finish, resultados.html is duplicated as resultadosmeta.html
  - o If they're at an intermediate, resultados.html is duplicated as resultadosdurante.html
  - o If they're at a group of timed controls, resultadosgruponn.html is created
- oprecision.css, LogoL.png, LogoR.png
  - o File containing the style of the HTML results file
  - o Logos is the left part and right part of the head of the results page
- Idem than HTML but in CSV format. Allows to process the data easily by third parties
- grafismo.png, grafismo.csv. It is a very static graphic design of: List of results; of a bib number - normal controls; of a bib number - groups of timed controls

Next, correspondence between the data of the images and the texts in CSV

The screenshot shows a 'Category selection' dialog box on the left with 'Open' selected. To the right is a table of results for 'Castro de Viladonga 2022, 09/03/2022, Sprint'.

Pos.	Bib#	Points	T	Timed
1	12	21	1432.00	
2	143	21	1647.00	
3	303	21	1799.00	
4	333	21	2135.00	
5	87	20	1148.00	

The screenshot shows a 'Results of a #Bib' dialog box on the left for bib number 87. To the right is a table of results for bib number 87.

Type	Bib#	Points	T	Timed
Subtype	Normal controls			
Time	87 LICEO	Points: 20	1148.0	0

The screenshot shows a 'Results of a #Bib' dialog box on the left for bib number 642. To the right is a table of results for bib number 642.

Type	Bib#	Points	T	Timed
Subtype	Timed groups			
Time	642 USC	Points: 0	1079.0	0
Group	1 Time	130.0 Points	0	0
Group	2 Time	124.0 Points	0	0
Group	3 Time	114.0 Points	0	1
Group	4 Time	123.0 Points	0	1
Group	5 Time	143.0 Points	0	0
Group	6 Time	145.0 Points	0	1

- Meaning of icons: 0=Ok; 1=Mistake; 2=Not Answered; 3=Annuled; 4=Rectified

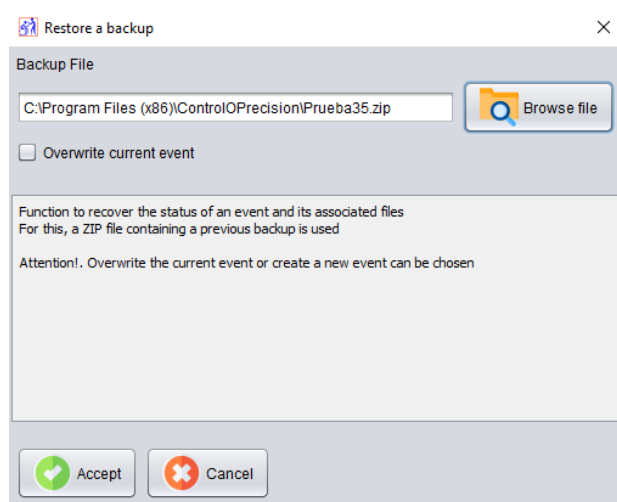
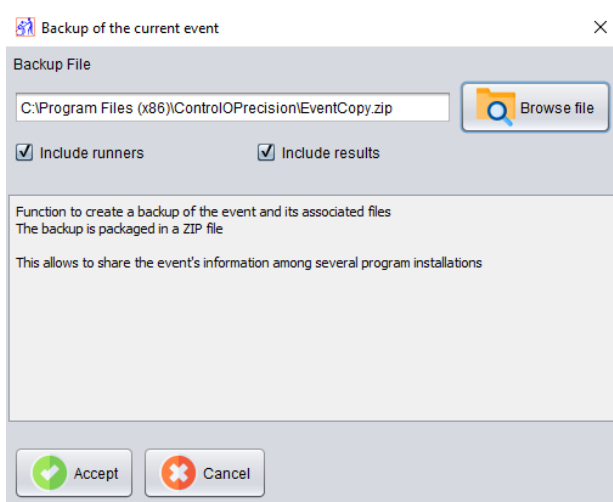
## Appendix. Event backup and recovery

The most direct way to backup is to save the application folders. The BDH2 folder contains the DB with all the events and their data. The DocsEventos folder contains a subfolder for each event and, within it, the documents that are generated for the event: results, graphics, additional configuration, etc.

Two features have been added for creating a backup and recovery, respectively, of a specific event.

To make a backup, it's always made of the event active at that moment. The user can select a file name in any folder on the computer. The file will have the .zip extension since the backup is a compressed file that contains both the database data dump for that event and the documents that have been generated. Additionally, the user can select if they only want to export the event configuration (event, categories, normal controls, groups of timed controls), although they can also say if the participants have to be included, and even make a complete dump including results.

Backup recovery consists of selecting a valid backup file. The user can select whether they want to override the currently active event or create a new event.



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