X2 Club
Installation Manual

	Date	Amendments
Revision 3.00	20/06/14	This is the first version of this manual
Revision 3.01	22/07/14	Updated the manuals to the 3.0HF1 firmware version
Revision 3.02	10/10/14	Added noise conversion table to Appendix

REVISION HISTORY

1 Introduction

X2 Club is the all-in-one solution for selecting track loops to manage race data and assign the results to a database. It is an intuitive, quick and easy to install system.

A flexible component structure makes X2 Club suitable for all types of races, and the user-friendly interface allows you to quickly configure and monitor the system.

1.1 Scope of this manual

This manual is intended for operating and supervisory personnel and provides information on installing the X2 Club hardware and software.

The manual is divided into the following sections:

- ***Safety*** (page 4): Important safety aspects when installing and operating X2 Club
- ***Description*** (page 7): physical description of X2 Club components
- ***Installation*** (page 11): initial installation of the equipment (and removal if required)
- ***Troubleshooting*** (page 17): tables with potential problems, causes and solutions
- ***Appendices*** (page 19): decoder menu selections, system specifications and signal strength/noise conversion table

1.2 Short information

More information

For more information please contact the nearest MYLAPS location or visit www.MYLAPS.com

MYLAPS Offices:

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2 Safety

2.1 Safety message explanation

This manual uses icons (see following examples) to highlight safety aspects during operating and maintenance steps (similar icons are physically attached on the Apex equipment where applicable)The following safety icons are used in this manual.

WARNING

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury

CAUTION

For conditions that may cause damage to the equipment or interfere with the normal processing

NOTICE

Indicates a situation which, if not avoided, could result in damage to the equipment or environment, or data loss

In addition the following icon is used on some equipment as an environmental warning:

DISPOSAL

Disposal - Your MYLAPS products and accessories were developed and manufactured with high-quality material and components that can be recycled and reused. This symbol means that electronic and electrical appliances, which have reached the end of their working life, must be collected and disposed of separately from household waste material. Separate collecting systems are usually in place for disused electronic and electrical products. Please dispose of these units at an environmentally compatible recycling facility, per European Directive 2002/96/EC.

2.2 Important safety instructions

Read, follow, and retain for future reference all of the following safety instructions. Follow all warnings before operating the X2 Club equipment.

1. Clean only with a dry cloth. Do not use liquid cleaners or aerosol cleaners.
2. Do not install equipment near any heat sources such as radiators, heaters, stoves, or other equipment that produce heat.
3. Never spill liquid of any kind on the equipment.
4. Take precautions to protect the equipment from power and lightning surges.
5. Adjust only those controls specified in the operating instructions.
6. Operate the equipment only from the type of power source indicated on the label.
7. Unless qualified, do not attempt to service damaged equipment yourself. Refer all servicing to qualified service personnel.
8. Install in accordance with the manufacturer's instructions in accordance with applicable local codes.
9. Use only accessories specified by the manufacturer.

CAUTION

The Low Voltage power supply unit must comply with EN/UL 60950. The power supply must be a SELV-LPS unit or a SELV - Class 2 unit (Safety Extra Low Voltage - Limited Power Source)

CAUTION

Use only a +12 VDC power supply or PoE as a power source. The power supply unit must be isolated from earth

2.3 FCC and ICES compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- reorient or relocate the receiving antenna;
- increase the separation between the equipment and receiver;
- connect the equipment into an outlet on a circuit different from that to which the receiver is connected;
- consult the dealer or an experienced radio/TV technician for help.

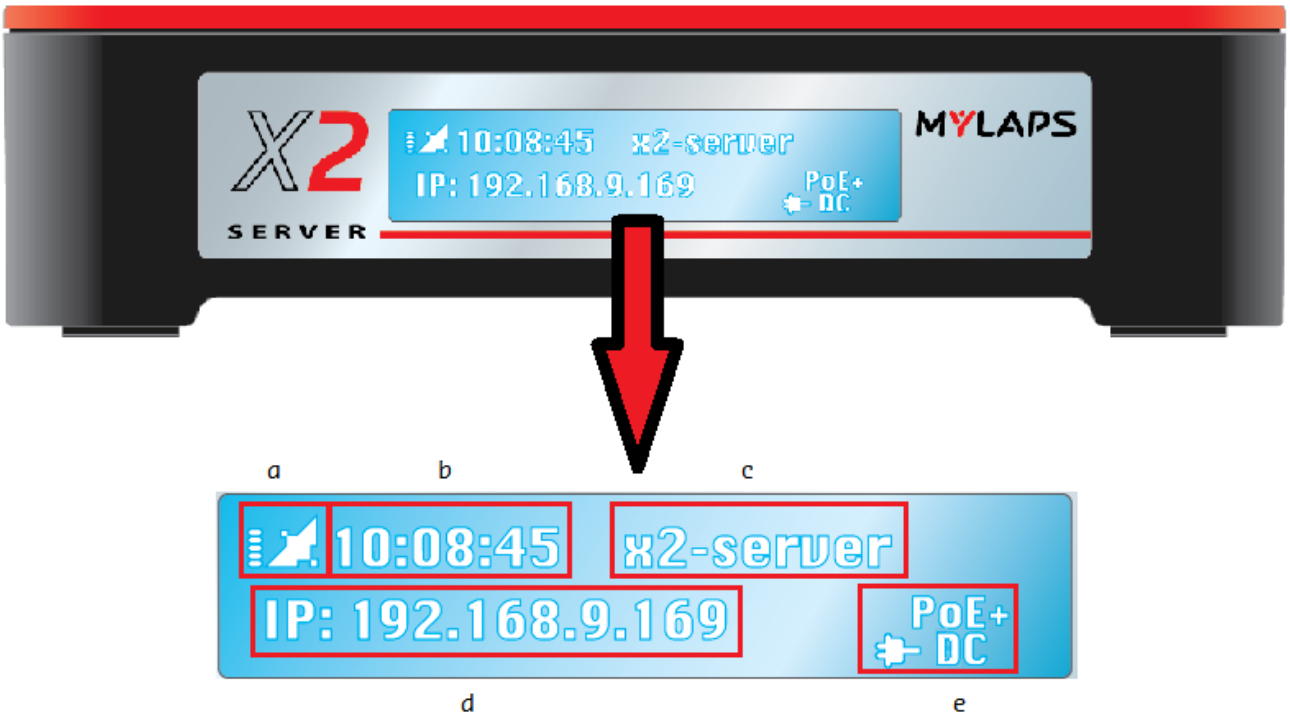
Intentional or unintentional modifications, not expressly approved by the party responsible for compliance, shall not be made. Any such modifications could void the user's authority to operate the equipment. If necessary, the user should consult the dealer or an experienced radio/television technician for corrective action.

The user may find the following booklet, prepared by the Federal Communications Commission, helpful: How to Identify and Resolve Radio-TV Interference Problems. This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

3 Description

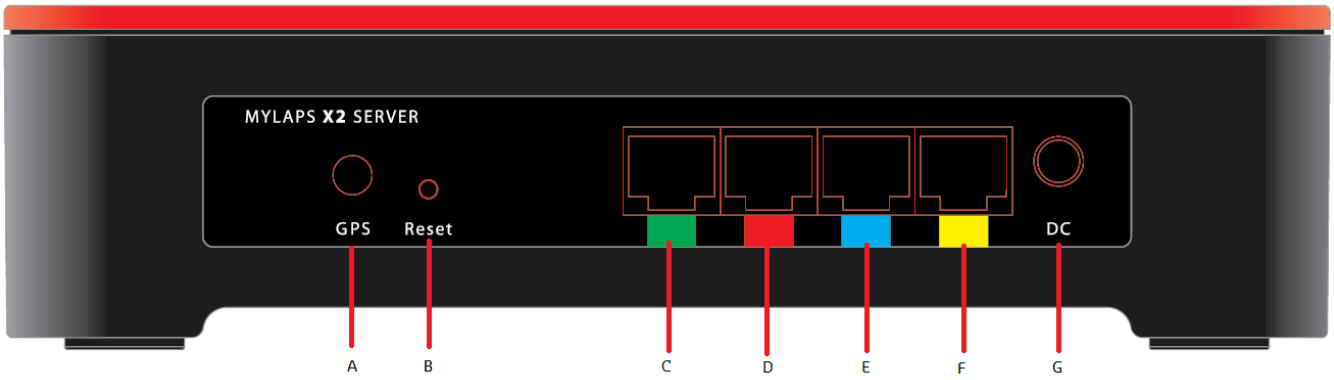
3.1 Server

Front Status panel



a) Blinks when GPS receiver is attached; lit when decoder is receiving UTC time from satellite (signal strength is shown beside)
b) Time of day; UTC when synchronized to GPS
c) Server name
d) IP address
e) Display of the connected power source

f) Rear Connections



A) Connection for GPS antenna cable
B) Reset button; to reset software to factory defaults; network settings will be set to DHCP and the admin login account will be set to 'admin'
C) Network connection between Server and Decoder or Timing network
D) Network connection between Server and Decoder or Timing network
E) Network connection between Server and Decoder or Timing network
F) Network connection between Server and Decoder or Timing network
G) Power connection for 12VDC power supply

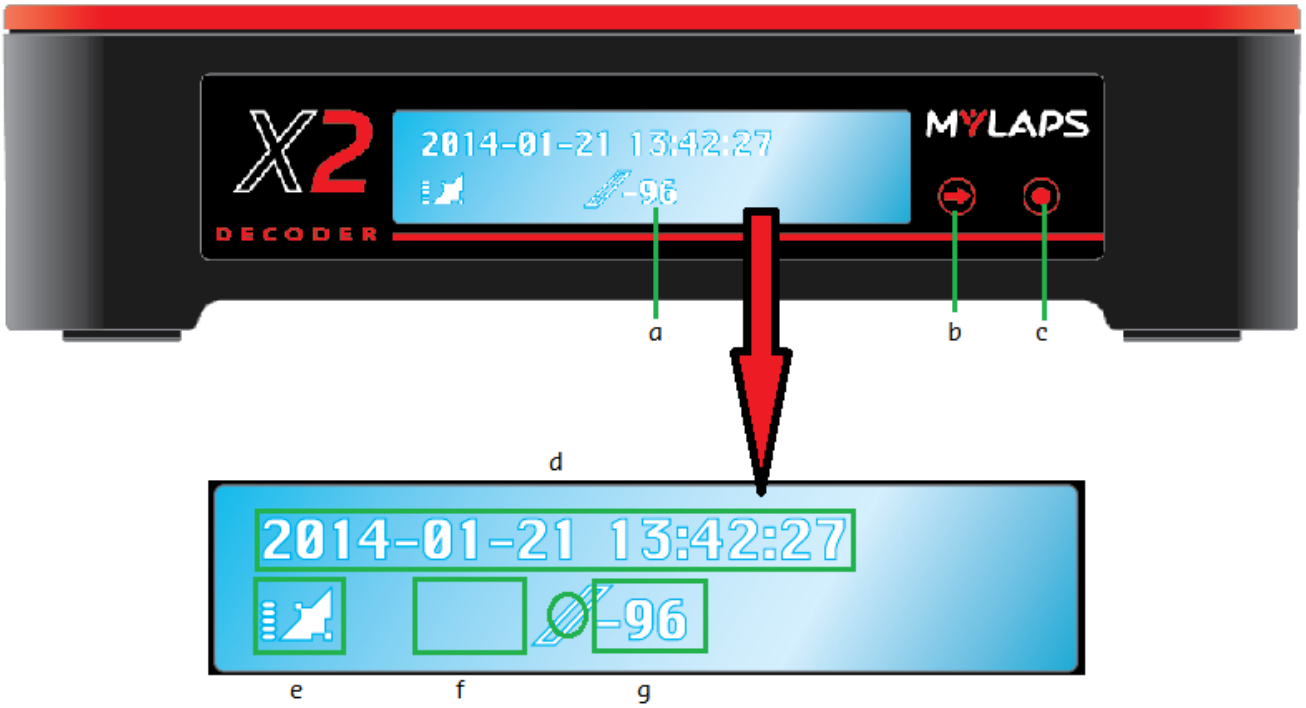
Note: The LEDs on the UTP ports will show if a physical network connection is available.

Note: A PoE(+) switch can be used to power the Server over a single UTP port. In this case, any of the four ports can be used to supply the power and the display will show a PoE or PoE+ icon.

Note: The four UTP ports are color-coded for examples on how the Server can be connected. There are no dedicated ports and all the ports have the same configuration.

3.2 Decoder

Front panel

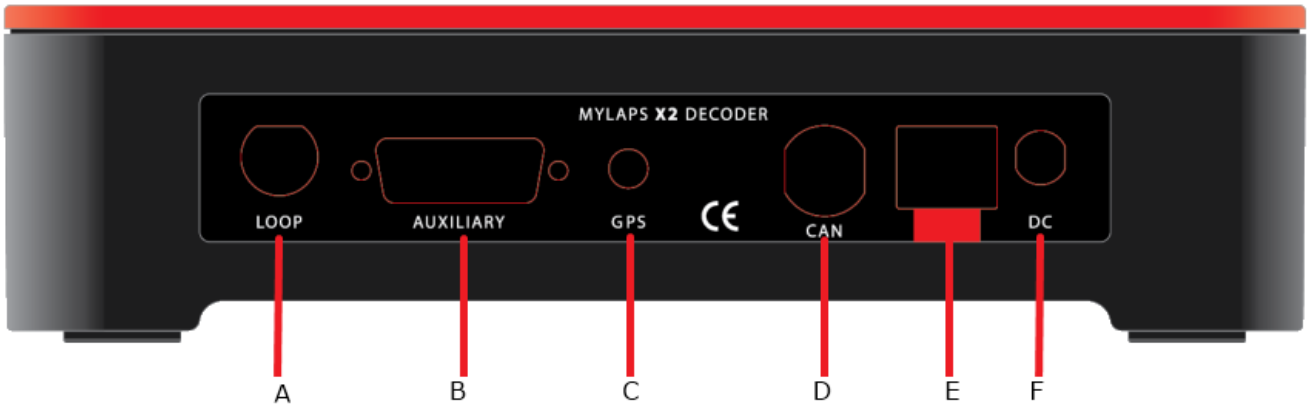


a) Decoder display
b) Select button
c) Acknowledge button

d) Date and time, UTC when synchronized to GPS or NTP
e) Time source indication:
   A)  GPS: time displayed in UTC
   B)  NTP: Time displayed as received by time sync source
   C)  RTC: decoder time (not synced to a time source)
f) Strength of the last received transponder
g) Indication that hits are being received by the detection loop. When hits are received the icon will be solid.

Use  (select button) to scroll through menus; use  (Acknowledge button) to select a sub-menu or highlighted option.

Rear connections



A) The detection loop: Connect the coax cable coming from the loop to the X2 Decoder.
B) The Auxiliary port: This port can be used to connect a photocell, external start pulse or a sync pulse. For more information on how to connect these devices, see the decoder manual Appendix D.
C) The GPS antenna: Connect the GPS antenna cable and place the antenna where it has a clear view of the sky overhead to be able to make connections to satellites.
D) CAN Connector: for future use
E) Network connection: Use a UTP cable to connect the Decoder to the server.
F) Power: Connect the supplied VDC adapter to the decoder and the mains. It is recommended to connect the VDC adapter to the mains through an uninterruptable power supply (UPS) to avoid any interruption of power supply to the decoder.

4 Installation

4.1 Packing list

Unpack the equipment carefully and handle it with care. If equipment has been damaged during shipment, repack it in the original packaging and notify the shipping agent or supplier.

The **server** packaging contains:

- Server
- 110-230 VAC power cable with local connector (2.5m; 8ft)
- 12 VDC switching adapter (2.7A)
- GPS antenna with cable (5m; 16ft)
- Cat 5E UTP Ethernet cable (2m; 6ft)
- Quick Start Guide

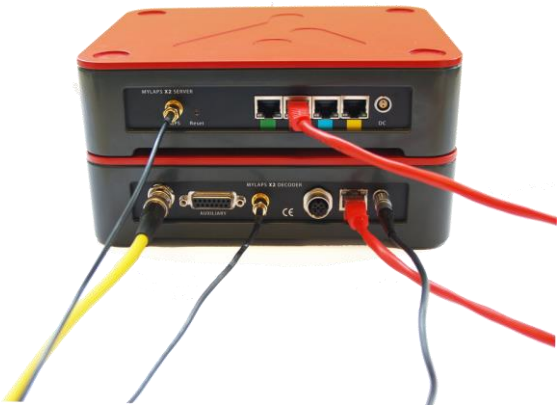
The **Decoder** packaging contains:

- Decoder
- 110-230 VAC power cable with local connector (2.5m; 8ft)
- 12 VDC switching adapter (2.7A)
- GPS antenna with cable (5m; 16ft)
- Cat 5E UTP Ethernet cable (2m; 6ft)
- Quick Start Guide

If components are missing, contact MYLAPS or your supplier.

4.2 Install system [HS1][HS2][HS3][HS4]

1.	Use the coax cable to connect the (Start/Finish) track loop to the (S/F) decoder.	
2.	Attach the GPS antenna to the decoder and position the antenna in a location where it can receive a satellite signal. Note: The real time clock (RTC) in the decoder is pre-set with the correct UTC time. This will be displayed on the main decoder display with a clock icon. The GPS signal helps synchronize the decoder clock to UTC time at power down.	
3.	If required, use the auxiliary port to attach auxiliary equipment to the decoder: • Photocell • External Start pulse • Sync pulse	

4.	Use the UTP cable to connect the red port on the server to the decoder: • If required, use the green UTP port to attach an additional decoder to the server (use an optional switch if more decoders are used)	
5.	Attach the GPS antenna to the server: • Position the GPS antenna in a location where it can receive a satellite signal • When power is applied, the server clock will synchronize to the satellite UTC time* *when no GPS signal is available, the server will always sync to the main decoder	
6.	Attach the 12 VDC power adapter to the decoder and to the AC mains power supply: • The decoder has no on/off button and will start working immediately • The display will show the date and time, plus a small clock icon Note: The real time clock (RTC) in the decoder is pre-set with the correct UTC time. This will be displayed on the decoder display together with a small clock icon. Any extra connected decoders and the server (with no GPS) will synchronize to this main (S/F) decoder time and display the same time together with the network time protocol (NTP) icon 	

7.	Attach the 12 VDC power adapter to the server and to the AC mains supply: • The server has no on/off button and will start working immediately • The display will eventually show a DC power supply icon and the time (synchronized initially from the main decoder and eventually from GPS) • When there is GPS reception, the display will additionally show a satellite icon with a signal strength indication	
8.	Optionally, you can connect the server to a PoE switch for an alternative power supply. In this case, the display will show a PoE power supply icon. The PoE supply can also be used together with a DC power supply. In this case the PoE(+) supply is a secondary 'back-up' power supply. If the DC power supply is disconnected, the Server display will show a blinking DC icon. Note: When using a PoE(+) switch, the MYLAPS X2 Server can be powered over a single UTP port. In this case any port can be used and the display will show a PoE or PoE+ icon.	
9.	Use the UTP cable to connect the blue port on the Server to a local computer network, or to a laptop. The LEDs on the port will show if a physical network connection is available: • Make sure your computer is configured to obtain an IP address automatically. • Check the display to see if the Server obtained an IP address from a DHCP server. • If no DHCP server is available on the network, the MYLAPS X2 Server will obtain a 'local link' IP address itself and the display will show an IP address in the 169.254.x.x range. This will occur, for example, when the network port is connected directly to a laptop via a UTP cable.	

10.	When the IP address is shown on the server, you have successfully completed installation	

4.3 Uninstall X2 Club

1	Disconnect power to the server • The Server will only shut down when both DC power supply and PoE power supplies are disconnected. • Power down will take a few seconds as the Server will first close down the database using its internal 'close down' power source. The display will show 'powering down'	
2	Disconnect power to the decoder(s)	
3	Wait until power down is completed and server and decoder displays are empty.	
3	Disconnect all physical cables from server and decoder(s).	

5 Troubleshooting

5.1 Troubleshooting principles

This section offers information for troubleshooting installation problems with X2 Club. However, it is not a substitute for a thorough knowledge of X2 Club and its related systems.

If you encounter a problem that is not covered, or is not corrected by the suggested remedy, please contact MyLaps Support for qualified technical guidance on how to proceed further. Contact details for MyLaps are provided on the last page of this manual and on the MyLaps website.

The troubleshooting table (see *5.2 Troubleshooting table*) is divided into problem symptoms and their possible causes, plus a suggested remedy. Always review the complete list of possible causes for each problem before selecting which remedy to apply. Problems with an obvious cause and remedy are not included in this table. However, if you encounter a problem that you feel *should* be included, please notify MyLaps Support and supply the following information:

- the problem
- the possible causes you considered
- the remedy/remedies you applied

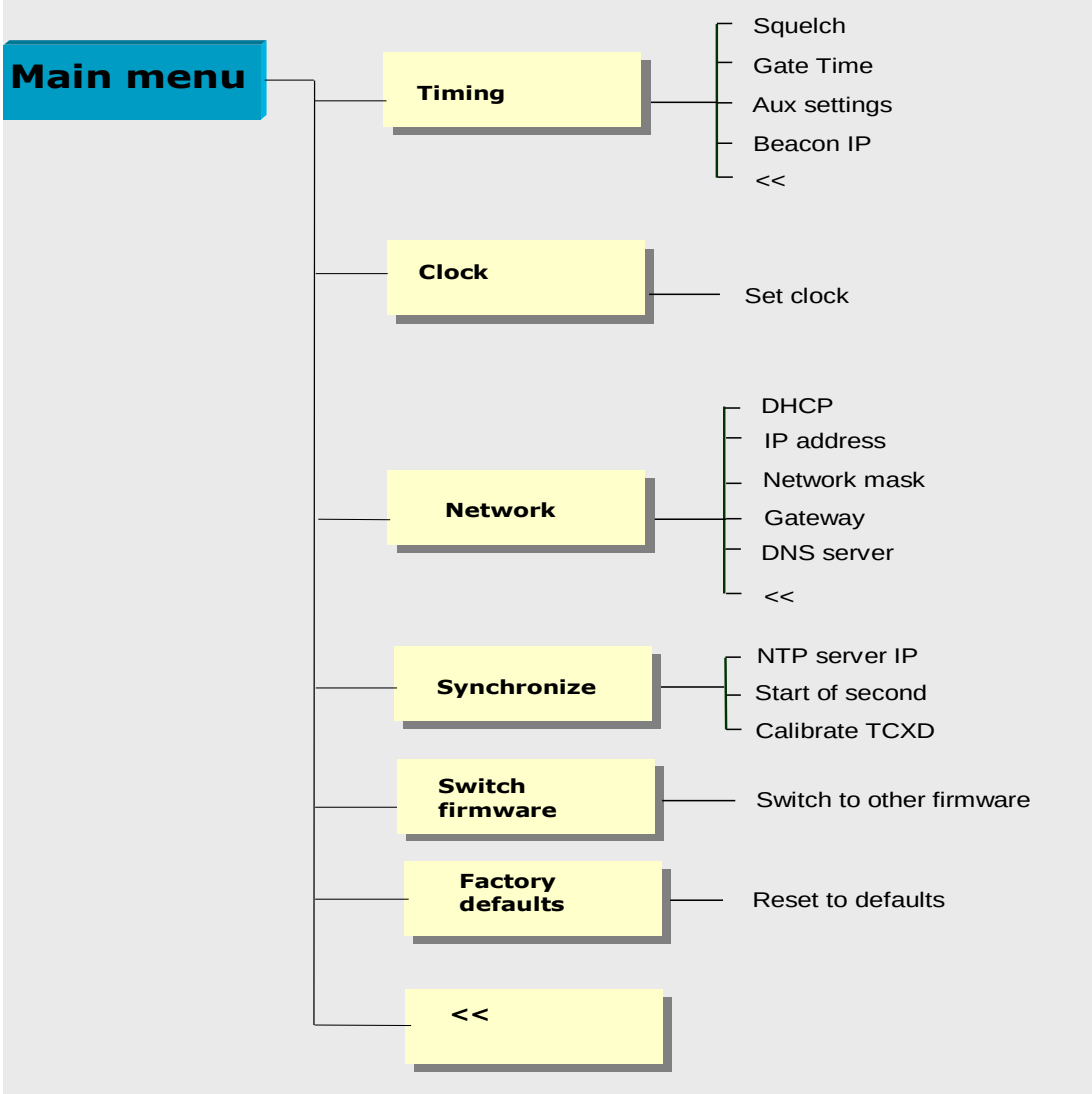
5.2 Troubleshooting table

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Error messages:		
Activator overload	The overcurrent protection of the activation circuit is working	Check for a short circuit in the coaxial cable, or for an incorrect loop or connection box
Activator hot	The temperature of the activator circuit is too high	Ensure the decoder is used at ambient temperatures below 50C/122F to prevent problems with the loop
X2 Club cannot find a device	Lost connections	Check your connections Choose correct network device
Decoder display window shows incorrect date	GPS satellite is out of range	Access decoder 'Clock' menu and change date
Server display window shows incorrect time	GPS satellite is out of range	Reposition antenna
Received signal strength is below -65 dBm	The signal strength is fluctuating heavily in combination with high noise levels.	Check the position of the transponder. Check the qualityof the loop installation and coaxial cables

Noise is higher than -50 dBm	A higher interference level is picked up by the system.	The noise level should be as low as possible, but as long as the received signal from the transponders is at least 20 dBm higher than the noise level, detection will be reliable. If the noise level is higher than -70 dBm, check the following: • When the detection loop is damaged, a fluctuation in noise level will be noticeable, especially in wet conditions. If this is the case, please check the loop wire and co-axial for cuts or breakage • Electrical equipment too close (<3 m) to the loop or coaxial cable. • Generator has a poor ground connection • Use of DC/AC converter for AC power. • Poor connections between the detection loop and the coaxial cable. • BNC connector incorrectly fitted to the coaxial cable • Poor ground connection of the AC power
Server display window shows incorrect time	GPS satellite is out of range	Reposition antenna
Some transponders are not being detected		Check the mounting position of the transponder, for more information check your transponder manual.
None of the transponders are being detected	The problem is most likely related to the detection loop, decoder, timing computer or cabling	Check if the loop in the display changes to black during a transponder passing. If this is working, but nothing appears on the computer screen, check the cabling between the decoder and the computer. Check the coaxial cable by measuring the resistance (with multimeter) between the center pin and the outside of the BNC connector. The reading should be approximately 100 kOhm after 30 seconds. If not, replace the cable. Check the loop wire by cutting the loop wires from the connection box and measuring the resistance between the loop wires in the track. The reading should be approximately 470 Ohm. If not, the loop must be replaced. When (re)soldering the loop wires to the connection box, use proper connections

Appendix 1: Decoder menus

The X2 Club decoder has the following menu structure:



Timing

Squelch
Used to suppress weak transponder signals (this is useful to filter out participants accidently picked up when walking near the loop or the coaxial cable). For example, if the squelch setting is set to -40 dBm, all transponders generating a signal strength below -40 dBm will be ignored.

Gate time
Delay time for transponder to cross loop sensor area and register in the system.

Auxiliary settings
AUX 1 Holdoff

AUX 1 Edge
AUX 2 Holdoff
AUX 2 Edge
AUX 3 Holdoff
AUX 4 Edge

If you select an AUX Holdoff setting, you must enter a time in milliseconds that the decoder will wait before accepting a new pulse via one of the inputs. The holdoff period is activated at the start of the pulse and all other signals are ignored during the set period.
If you select an AUX Edge setting you must choose which signal edge will trigger a reaction (choose from Rising, Falling, Any or None.

- Rising triggers a reaction on a pulse that looks like:
  _____|---|_____
- Falling triggers a reaction on a pulse that looks like:
  ----------|_|----------
- Any causes a reaction on both type of edges.
- None gives no reaction at all.

Beacon IP
Loop identification for extra beacon loops (maximum 63) in a race circuit.

Clock

Here you can set your decoder clock to a specific date and time. First select the desired date, and then the time in hours and minutes; the decoder will then ask you to select ACCEPT. At the exact moment ACCEPT is selected, the decoder clock will start at the selected time from zero seconds. For example, set the new time to 11.15 and press ACCEPT; the decoder clock will start counting at exactly, 11h:15m:00s.

Network

DHCP (Dynamic Host Configuration Protocol)
You can select here either On or Off. If your decoder is placed in a network, the decoder will ask the DHCP server for an IP address within the range of the network. Please note that it can take approximately 60 sec. to obtain the settings via DHCP.

IP address
Enter here an identifier for a computer or device on a TCP/IP network.

Net mask
Enter here a mask id to determine which subnet an IP address belongs to.

Gateway
Enter here a node id for a network that serves as an entrance to another network.

DNS server (Domain Name System)
Enter here an internet service id that translates domain names into IP addresses.

Synchronize

NTP server IP
IP address obtained via an NTP (Network Time Protocol) server.
This setting is only applicable when NTP is used as sync method via the X2 work station.

Start of second
Assign here the input port for the sync pulse to increase the precision of the synchronisation when using the NTP protocol.
Options are: AUX 1, AUX 2, AUX 3, None.

Calibrate TCXO
Calibrates the internal decoder clock (only works if the decoder is connected to a GPS antenna).

Switch firmware

When you update the firmware (software running inside the decoder), the decoder will retain the previous firmware version. Use the switch firmware option to revert back to the previous version.

Factory defaults

Reset to the factory default settings.

Appendix 2: Specifications

Environmental	
Pollution degree	III
Protection class (rear lid closed)	IP54
Operating temperature	-20 to +50 °C (-4 to +122 °F)
Relative humidity	Max. 90%, non-condensing

Server	
Material	Aluminum
Dimensions (B x D x H)	220 x 180 x 60 mm (8.7 x 7.0 x 2.4 in)
Weight	1.8 kg (3.9 lb)
AC voltage (external power supply)	100 to 240 VAC at 50/60 Hz
DC input voltage	10 to 14.4 VDC, Typical 12 VDC
Power consumption	max. 15W per connection
Network interface	10-100BT (RJ45)
GPS Receiver	quick fix, -160 dB, 15 nS
Storage	120 GB, solid state
Cooling	Passive
Internal battery	30-second soft power down after power loss
Communication	Network apparatus (for internet/local network)

Decoder	
Material	Aluminum
Dimensions (B x D x H)	220 x 180 x 60 mm (8.7 x 7.0 x 2.4 in)
Weight	1.5 kg (3.3 lb)
Clock stability	0.5 PPM
GPS Receiver	quick fix, -160 dB, 15 nS
Dual Decoding circuitry up to	-100 dBm sensitivity, TranX3 and X2 transponder range
Timing Resolution	0.0001 s
Loop Telemetry	32 kbps, 8 bytes per hit
Loop connection	1 x BNC, max. 20 m loop

DC input voltage	10 to 14.4 VDC, Typical 12 VDC
Power consumption	Approx. 5W
Network interface	10-100BT (RJ45)
Communication	Network apparatus (for internet/local network)
GPS antenna connection	SMA, active
CAN connection	Not used in this version
Auxiliary connector	DB15, Female
Auxiliary connections	1x 5 VDC, 100 mA, output 1x Opto coupled closing contact, max 50 mA, output 3x Opto coupled, 5-12 VDC / 5-15 mA, inputs

Norms and Directives*

Safety norm	EN60950
EMC norm	89/336/EEC.
FCC	Class B, part 15

*A copy of the declaration conformity can be obtained at:

MYLAPS Sports Timing
Zuiderhoutlaan 4
2012 PJ Haarlem
The Netherlands

Appendix 3: Signal strength/noise conversion table

The table below is showing a conversion from the new transponder signal strength and noise indication compared to the former scale used by MYLAPS/AMB:

dBm	MYLAPS/AMB Strength
-110	0
-105	0
-100	0
-95	13
-90	27
-85	41
-80	55
-75	70
-70	84
-65	98
-60	113
-55	127
-50	141
-45	155
-40	170
-35	184
-30	198
-25	213
-20	227
-15	241
-10	255

MYLAPS/AMB Strength	dBm
0	-99,4
10	-95,9
20	-92,4
30	-88,9
40	-85,4
50	-81,9
60	-78,4
70	-74,9
80	-71,4
90	-67,9
100	-64,4
110	-60,9
120	-57,4
130	-53,9
140	-50,4
150	-46,9
160	-43,4
170	-39,9
180	-36,4
190	-32,9
200	-29,4
210	-25,9
220	-22,4
230	-18,9
240	-15,4
250	-11,9