ChampionChip®

Manual

DigiBox 2

US Version

by
ChampionChip BV
The Netherlands
April 2006

it's about time...

CONTENTS

PREFACE

Read this first

About this manual

This manual describes the DigiBox 2, how to use it and how it is operated.
Please note: in this manual ‘DigiBox 2’ can be written as ‘DB’.

Safety Precautions

Warning
Where this mark is found on the DigiBox 2, there is a danger of injury. Please check the manual carefully to find out more about the danger.

Extra warning
High voltage might be present. Where this mark is found on the DigiBox 2 there is a danger of injury or death. Please check the manual carefully to find out more about the danger.

Attention
This product will be notified in the country where it will be used.

Note
This arrow indicates conditions which must be met, or procedures which must be followed, to ensure proper functioning of the equipment.

1 INTRODUCTION

Read manual before use

The ChampionChip DigiBox 2 is a controller that powers the antennas, collects data from chips and combines the code of the chips with the times. The DigiBox 2 is portable. It is designed and meant for battery operation during outdoor sports events.
The DigiBox 2 consists of 16 internal readers, 4 antenna mat connectors, rechargeable internal batteries and recharging unit and a RS485 data communication interface. The readers are operated by 1 microprocessor and buffer memory to store Chip codes and compare them to the ones previously read.

Basic principle

Every participant in a ChampionChip timed event carries a special chip, the ChampionChip. When this chip passes a ChampionChip timing system, the chip will emit a unique code. The ChampionChip System operates with send and receive antennas that are cast in mats. These Antenna Mats are placed at the finish line and other timing locations. They are connected to DigiBoxes at the side of the road.

DigiBox 2

Dimensions: 480 x 320 x 320 mm
Weight: 14 kg

Antenna mat (Classic or Light Weight)

Dimensions: 210 x 100 x 1,2 cm
Weight: 30 (Classic) or 15 (Light Weight) kg

The Readers in the DigiBox 2 and the antennas in the mats have a double function:
- Together they generate a magnetic field.
- Together they receive the Chip-codes signals.

Every timing location is operated by one or two ChampionChip Ears or PC's (laptops). The Ear connects the DigiBoxes to a central computer with a direct serial line, a regular modem, or a cellular modem.

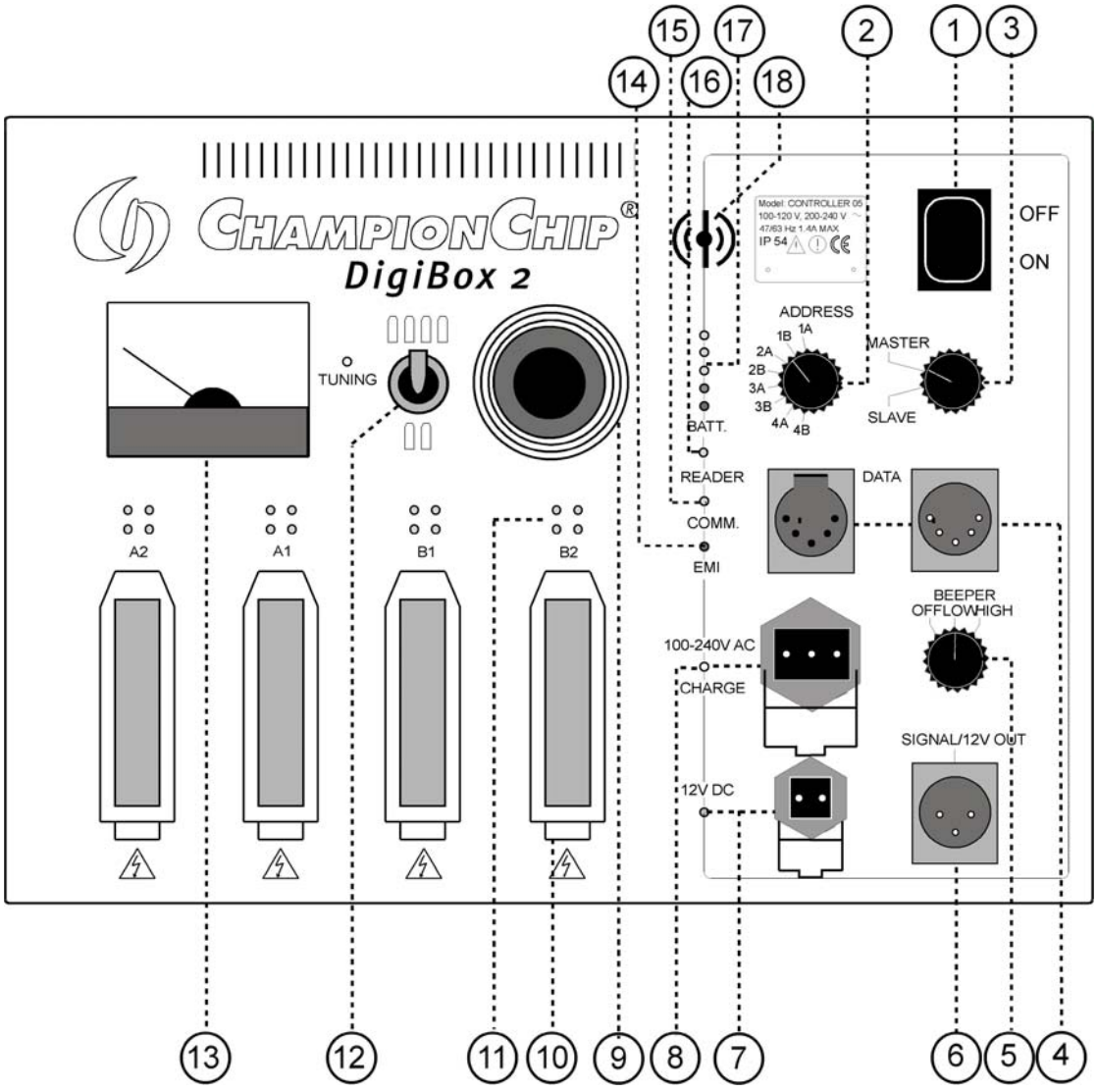
The Ear is a specially designed device for operating the DigiBoxes and Antenna Mats. It could also be called the ChampionChip laptop. The Ear is responsible for:
- Controlling the antennas on the road and switching on and off the magnetic field to charge chips
- Keeping accurate time.
- Data collection and storage (chip codes and times).
- Passing on data to the central result computer.

When the system is running, this is what happens:
- The Ear sends the time and a command to the DigiBox 2.
- Internal Readers in combination with send antennas emit an electromagnetic field for 30 milliseconds.
- Any chip within reach of this field will be charged up with energy.
- All the chips that are charged will send their unique identification number.
- The receive antennas and the readers in the DigiBoxes will receive these signals during a 20 milliseconds period. These signals (the number and corresponding time) are then stored in the DigiBoxes and transferred to the Ear for further processing.
- The Ear stores the codes and times, together with some system info like reader and antenna number.

For more information about how the ChampionChip System works, please read the CC-System Manual.

2 DESCRIPTION OF THE DIGIBOX 2

2.1 Front Panel



1 *On / off switch*
2 *Address switch*
3 *Master / slave switch*
4 *Male + female data connectors*
5 *Beeper switch*
6 *External signal / 12V connector*
7 *External battery connector*
8 *Charge connector*
9 *Send antenna tuning knob + LED*
10 *Antenna mat connector*
11 *Detection LEDs*
12 *Selection switch for 2 or 4 antenna mats*
13 *Send antenna field strength meter*
14 *Electro Magnetic interference (EMI) LED*
15 *Communication LED*
16 *Reader LED*
17 *Battery LEDs*
18 *Beeper opening*

LED's

- *Black = red*
- *Grey = green*
- *White = yellow*

2.2 Explanation of Controls

1 On/off switch (+ LED)

This switch is needed to start the DigiBox 2

2 Address switch

The addresses on the DigiBox 2 are:
1a + 1b + 2a + 2b + 3a + 3b + 4a + 4b

Rules for address settings:

- The addresses on all DigiBoxes connected to one Ear should be different.
- If a combination of different types of DigiBoxes is used, the first digit should be different as well.

The following table shows how reader numbers are displayed on the Ear.

	Address	**Ear** (reader number)
DigiBox 2	1a 1b 2a 2b 3a 3b 4a 4b	1a..... .... ….1b .... 2a..... .... …..2b .... 3a..... .... ….3b .... 4a..... .... …..4b

3 Master/slave switch

With this switch the DigiBox 2 can be set to “master” or “slave”

Please note!!

- The master DigiBox 2 creates only one “phase” signal for a number of Antenna Mats lying side by side. When multiple DigiBoxes are connected with a phase cable, only one can be the master. The others must be a slave. When the master/slave switches are not set properly, the meters (12) will constantly wave back and forth.

Rules for master/slave settings on the DigiBox 2:

- All Antenna Mats lying side by side need one master.
- If multiple DigiBoxes have Antenna Mats lying close together (1 meter or less), the DigiBoxes will need phase synchronization too.
- To transport a phase signal from one DigiBox 2 to another, a data/phase cable is needed. A data cable will block the phase signal. When two DigiBoxes need to be phase synchronized a data/phase cable is needed to transport the phase signal from the master DigiBox 2 to the slave DigiBox 2.

4 Male + female data connectors

These connectors are used to connect data cables and the data/phase cables. One connector is male (left), the other female (right)

When the DigiBox 2must be upgraded, these connectors must be used. The connection from the DigiBox to the PC/laptop can be made in 2 ways :

- Connecting an Ear to the DB with a RS485 cable and connecting the PC/laptop to the ear with a RS232 cable
- Directly connecting the PC/Laptop to the DigiBox by an AutoPatt-cable

5 Beeper Switch

After every chip detection the DigiBox 2 will give a beep. With this switch the beeper signal can be turned “off”, “low” or “high”.

6 External signal/12V connector

This connector has two outputs:

- A signal for every chip detection (the same as for the internal beeper) 12V / 2 A Max.
- A continuous 12V, 2 A Max.

7 External battery connector (+ LED)

This connector has to be used to connect an external 12 V battery. This may be needed when timing a long event, or when the batteries are not in good condition.
The LED next to this connector lights up if the external battery has a correct 12V output.

Use a 12 V Battery only !

8 Charge connector (+ LED)

This connector is used to charge the internal batteries.
The DigiBox 2 has an automatic power setting to change between 100-120 V to 200-240 V. The LED next to the connector indicates in three colors:

Red:	This led lights up when the battery power is low and charging begins.
Orange:	This led lights up when charging is still in progress, but not completed
Green:	This led indicates full battery and trickle charge.

Always charge indoor !

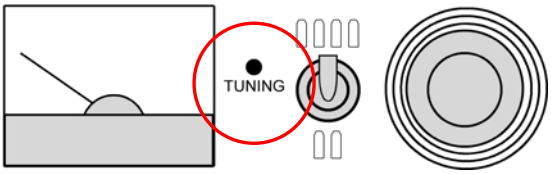
Don not charge when running the DigiBox 2 in a race. This might cause interference.

AC Mains input on Earth ! High voltage might be present

9 Send antenna tuning knob + LED

All 4 (or 2) antenna mats are tuned with this 1 tuning knob.

The LED is situated between the Selection Switch and the Field strength meter.



This LED has a double function: it indicates proper tuning and the degree of power consumption.

Green: this indicates normal power consumption.
Yellow: the DigiBox 2 using more power due to local circumstances, which discreases the operating time.
Red: the DigiBox 2 is using a lot of power which will decrease operating time drastically.
Blinking red: the DigiBox 2 is not tuned correctly and using too much power.

10 Antenna mat connector

The connectors are used to connect the Antenna Mats.

Be sure to connect the two long mat cables to the outside connectors, and the two short mat cables to the inside connectors

In the following cases the antennas should not be connected to the DigiBox 2:

- ***if the antenna is damaged***
- ***if the antenna cable is damaged***
- ***if the antenna connector is damaged***

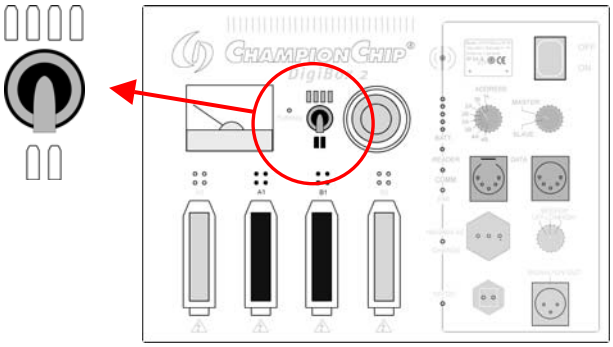
11 Detection Leds

Each set of Detection LEDs is related to one Antenna Mat and indicate chip readings.

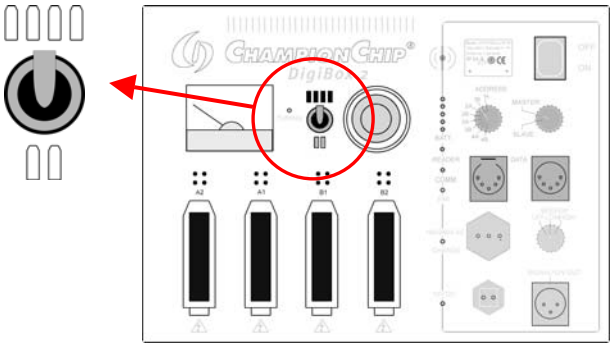
12 Selection switch for 2 or 4 mats

This switch is used to select a system set up with 2 mats or with 4 mats.

If a system is set up with 2 mats the selection switch must be put “down”, pointing at the 2 mat symbols. In a set up with 2 mats, be sure to connect the antenna mats to the 2 inner (central) connectors.



If a system is set up with 4 mats the selection switch must be put “up”, pointing at the 4 mat symbols.



13 Send antenna field strength meter

This meter indicates the level of the magnetic field of the Antenna Mats.

14 EMI LED

EMI = Electro Magnetic Interference.
This red LED indicates interference on the System. It is caused by other sources emitting RF-signals in the same frequency (134 KHZ). This source may be another CC System in the area without proper cycle synchronization through the Ears.
When the “EMI” led is on, the digital technology tries to suppress the interference.

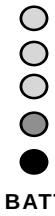
15 Communication LED

This LED indicates proper communication between the Ear and the DigiBox 2.

16 Reader LED

This LED indicates proper chip readings.

17 Battery LEDs



These LEDs indicate the status of the internal battery.
Check the batteries, preferably a day but at least 10 hours before the race, as it will take approximately 10 hours to recharge a fully drained battery. The 5 battery leds indicate:

Green (3x):	The top green led indicates that the batteries are completely full. The two green leds under it indicate the battery power is getting lower.
Yellow:	Battery power is weak.
Red:	Battery power is getting low. You can still run for one hour, but the field strength may be getting lower.

18 Beeper opening

Behind this opening, the beeper is situated.

3 OPERATING THE DIGIBOX 2

3.1 Setting up and connecting the DigiBoxes

- Unlock the rain cover of the DigiBox 2 by opening the 2 locks at the top (*see arrows in picture below*). During dry weather the rain cover can be stored in the back of the DigiBox 2.

- Lay down the 4 (or 2) antenna mats and connect the 4 (2) antenna cables to the DigiBox 2. Attach the antennas to the connectors on the front of the DigiBox 2. Make sure that the orientation of all antennas is correct by following these rules:
  - Long antenna cables are plugged in the outer connectors.
  - Short antenna cables are plugged in the central connectors.

  One 8 meter line of four mats must all be either A or B. This will automatically be achieved when the antenna cables do not cross and the above rules are followed.

In the following cases the antennas should not be connected to the DigiBox 2:
- ***if the antenna is damaged***
- ***if the antenna cable is damaged***
- ***if the antenna connector is damaged***

- Switch the DigiBoxes on with the on/off switch.
- Set the Address switches on the DigiBox 2. Please mind that all DigiBoxes connected to one Ear must have a different address, so the Ear can tell all readers apart.
- Set the Master / Slave switches on the DigiBox 2.
- If necessary, lay down the data/phase cables on the floor and connect them to the DigiBoxes. (The Data Phase cable is a cable for data communication and for phase synchronization between Antenna Mats lying close together).
- Connect the Ears to the DigiBoxes (For connecting an Ear to a DigiBox 2 a Data cable is needed.) Then start the Ears. The Ears will operate the system automatically. Make sure one of them is master and the other one slave.

- Put back the transparent rain cover. Put in the 2 top locks (*see arrows in picture below*) in the intended holes of the DigiBox 2 and do not attach the bottom of the rain cover behind the 2 black holds. This way the cover will protect the cable connections from rain.

IP54

The Protection Class of the DigiBox 2 is IP 54, but only when the transparent rain cover is replaced during operation (as described above).

If the transparent rain cover is not attached to the front of the DigiBox 2, the Protection Class of the DigiBox 2 is no more than IP 50.

3.2 Tuning

The best way to tune Antenna Mats:

- Put the Selection Switch “up” (in a 4 mats configuration) or “down” (in a 2 mats configuration).

  Please note: If a system is set up with 2 mats, be sure to connect the antenna mats to the 2 inner (central) connectors.

- Turn the tuning knob until the field strength meter reaches a maximum value, usually between 30 and 35.

- While tuning, watch the tuning LED. If the LED is green, tuning is OK. If the LED is yellow or even red, please read Chapter 2.2, item 9.

The DigiBox 2 is now tuned and ready for use. Repeat this procedure for any other DigiBox 2.

3.3 Running the DigiBoxes during a race

During a race you should check:

- if all DigiBoxes that are connected are present and can be seen on the displays of the Ears
- if the data transfer from the Ears to the central computers is OK.
- if the beep can be heard as runners are passing by
- if the reading distance is OK
- if the battery power is OK. Check the battery leds that indicate the status of the internal battery. (see also page 7, point 7).

  The battery lights indicate:
  Green: The top green led indicates that the batteries are completely full. The two green leds under it indicate the battery power is getting lower.
  Yellow: Battery power is weak.
  Red: Battery power is getting low. You can still run for one hour, but the field strength may be getting lower.

3.4 After a race

- Switch off the DigiBoxes and disconnect the cables.

Do not switch the Ears off, but bring them to the computer room when needed.

Recharge the DigiBox 2 as soon as possible.

Always charge indoor !

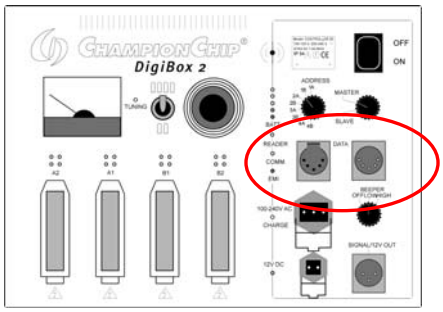
AC Mains input on Earth ! High voltage might be present

4 FIRMWARE AND SOFTWARE

4.1 Firmware

The DigiBox 2 has embedded firmware. Therefore there is no additional software needed to run it.

Updates of new firmware can easily be uploaded.
When the DigiBox 2must be upgraded, the male or female data connector at the front of the DigiBox 2 must be used.



The connection from the DigiBox to the PC/laptop can be made in 2 ways :

- Connecting an Ear to the DB with a RS485 cable and connecting the PC/laptop to the ear with a RS232 cable
- Directly connecting the PC/Laptop to the DigiBox by an AutoPatt-cable

If uploading new firmware through this connector is not working right, a back up option is possible. At the bottom of the DigiBox 2, there is a 'Program' cover. Beneath this cover there is a RS232 cable connector that can be used.

4.2 Software

For data collection & storage and passing on these data to a central result computer, other devices are needed. You can choose between:

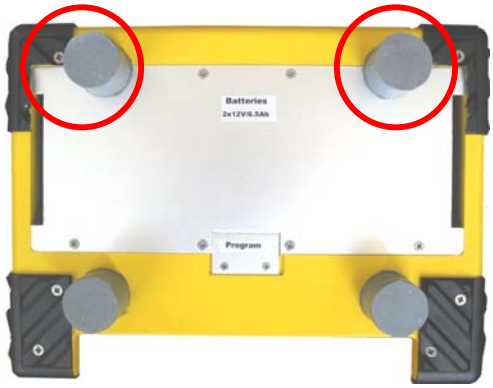
- The ChampionChip Ear
- PC / laptop

If the ChampionChip System is operated with Ears, the ChampionChip software program ReadLIte can be used on the result computer. For more information, please read the concerning manual that can be downloaded from the ChampionChip Partnersite.

If the ChampionChip System is operated with PC / laptops the ChampionChip software program CC_Talk is needed. For more information, please read the concerning manual that can be downloaded from the ChampionChip Partnersite.

5 CHANGING BATTERIES

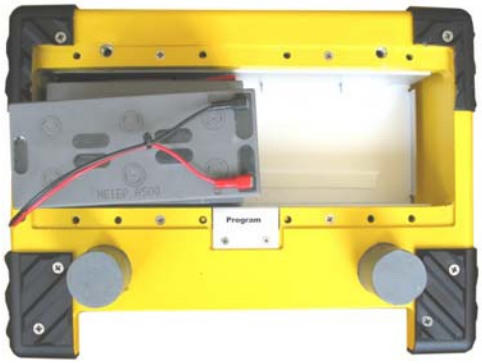
1 **Switch off the DigiBox and turn it upside down.**
Remove the 2 rubber dampers (shown in the picture alongside) by turning them counter-clockwise.



2 **Unscrew the 'Batteries' cover.**

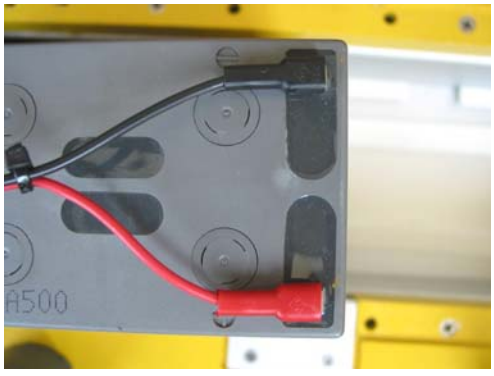
3 **Unplug the batteries and replace both of them with new ones.**

Make sure to replace the batteries with 2 new batteries of 1 brand only (preferably Sonnenschein A512/6.5S).



⚠ ***Use a 12 V Battery only !***

4 **Make sure to connect**
- **the black wire to the negative pole**
- **the red wire to the positive pole**



6 DIGIBOX 2 SPECIFICATIONS

Dimensions	375 x 320 x 280 mm
Weight	14 kg
AC input voltage/current	100-120V, 200-240V AC
Power consumption	115 VA Max.
DC input voltage/current	10,5-14V, 3,2A
Internal Batteries	2 x 12V, 6,5Ah
Battery operating time	Approx. 8 hours
Charge time	Approx. 10 hours
Operating temperature range	-20 - +45 C degrees
Storage temperature	-20 - +50 C degrees
Humidity level	Max. 95% (non condensing)
Pollution degree	III
Protection Class	With transparent rain cover: IP 54 Without transparent rain cover: IP 50
Safety norm	EN60950

APPENDIX: REGULATION STATEMENTS

Warning:
Changes or modifications made to this equipment not expressly approved by ChampionChip may void the FCC authorization to operate this equipment.

Note
This equipment has been tested and found to comply with the limits pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Label
This device is labeled to comply Part 15 of the FCC Rules and with RSS-210 of Industry Canada.

Operation is subject to the following two conditions:

- ***(1) this device may not cause harmful interference, and***
- ***(2) this device must accept any interference received, including interference that may cause undesired operation.***

CE Declaration of Conformity

We,

ChampionChip B.V.
Havenweg 15
6541 AD Nijmegen, The Netherlands

declare that the RFID controller

DigiBox 2

in accordance with the following Directives:

73 / 23 / EEC **The Low Voltage Directive;**
89 / 336 / EEC **The Electromagnetic Compatibility Directive;**

has been designed and manufactured to the following specifications:

EN 300 330-2 (2000)
EN 301 489-1 (2001)
EN 301 489-3 (2001)
EN 61000-3-2 (1995), with A1 (1998) and A2 (1998)
EN 61000-3-3 (1995)

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all essential requirements of the Directives.

Name and signature of authorized person	Wim Meijer
Function of authorized person	Managing Director
Place	Nijmegen NL
Date	September 10, 2004