HomeRider

USER MANUAL

Tank Trak Rochester

RECORD OF REVISIONS

Revision	Details	*Author*	*Validation*	*Date*
V0.01	Release 0.01	BMN	YES	mm/jj/2003

ABREVIATIONS

CR	Call Rider
Module	Trak or Call Rider
Serial Number	RF address of a module
SIHR	HomeRider Server
Trak	Metering Equipment

CONTENTS

1 INTRODUCTION

The Propane Trak Module is a system to manage the level of gas in a Tank. The module is intrinsic safety and is designed to operate in explosive area.

The module is powered by a battery that allow 10 years of operation.

Figure 1 : Propane Trak

The module casing allow operation in various area indoor and outdoor. The Rochester gauge type used is the Junior model. That is this system is able to replace directly the Rochester mechanical indicator witch is provided with the tank

2 TECHNICAL SPECIFICATIONS

2.1 Functional description

The module Propane Trak is designed to be installed on a Gas Tank equipped with a mechanical Rochester Gauge.
The module read le level on the gauge every hour and memorize it.
After 12 hour (12 reading) the module transmit a radio data frame with the level history of the last 12 hours to à C@llRider®. A C@llRider® is another part of the system that receive the data and then connect to internet and send the data over the net to the servers.

2.2 Hardware specifications

2.2.1 Mechanical specifications

The electronic part is housed in a specific casing.

Figure 2 : Casing Bottom

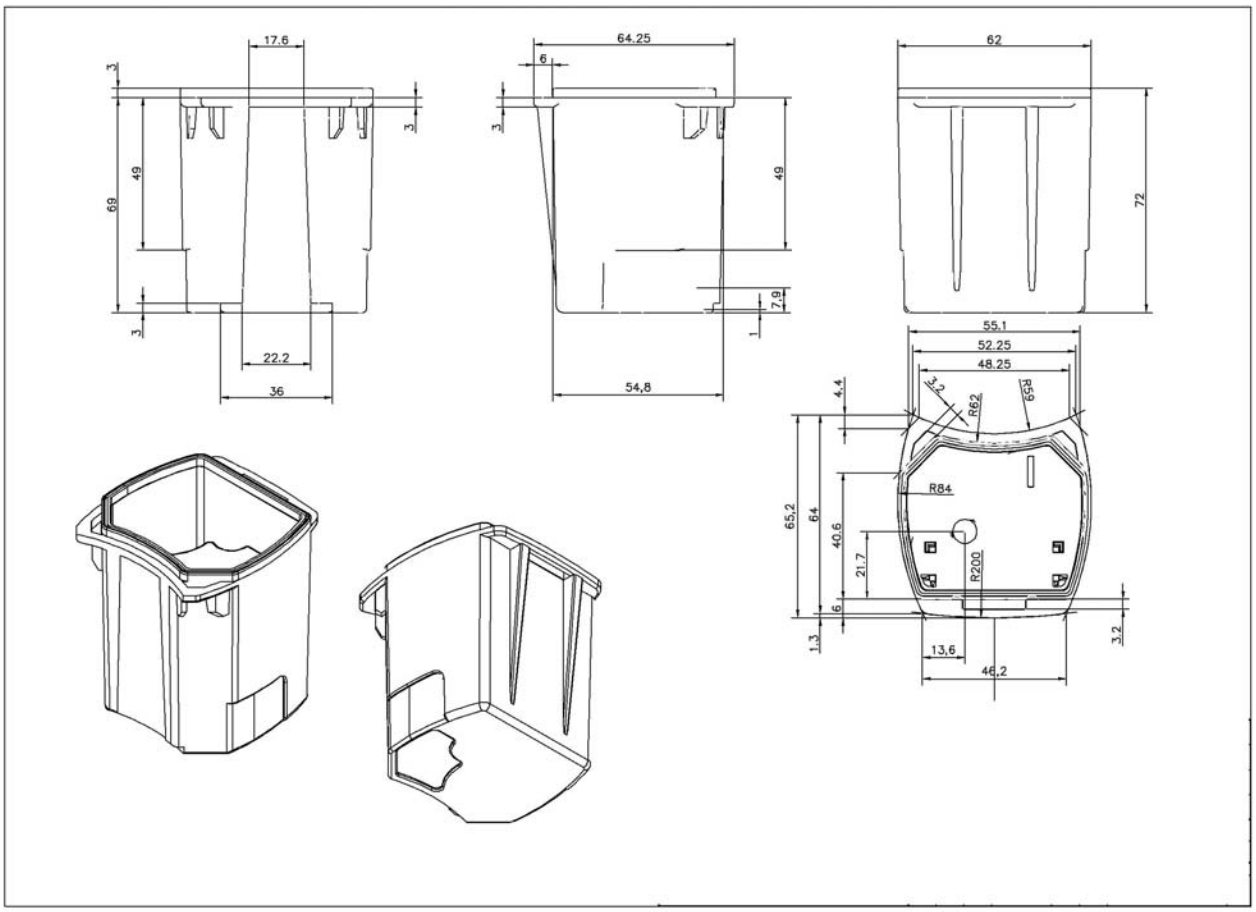


Figure 3 : Casing Top

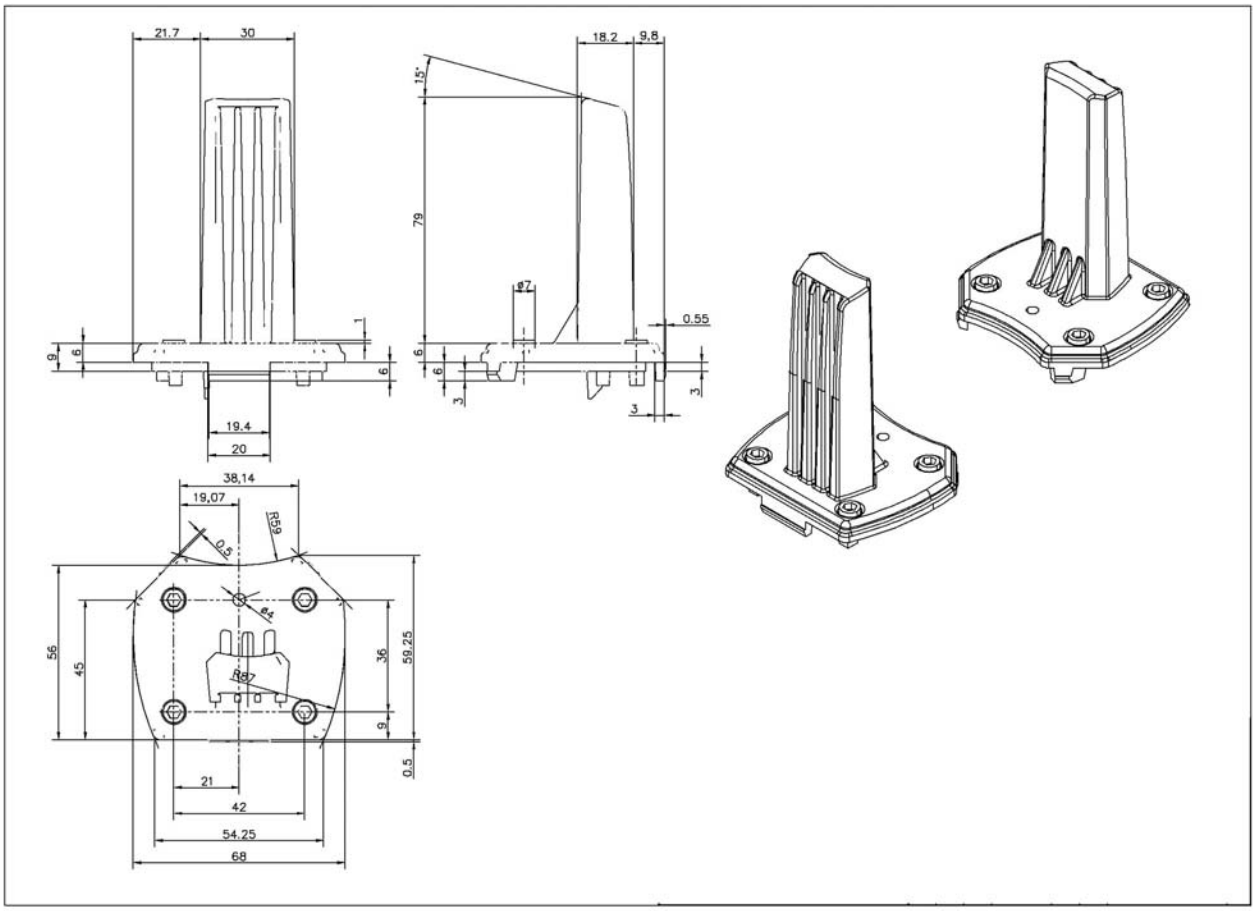
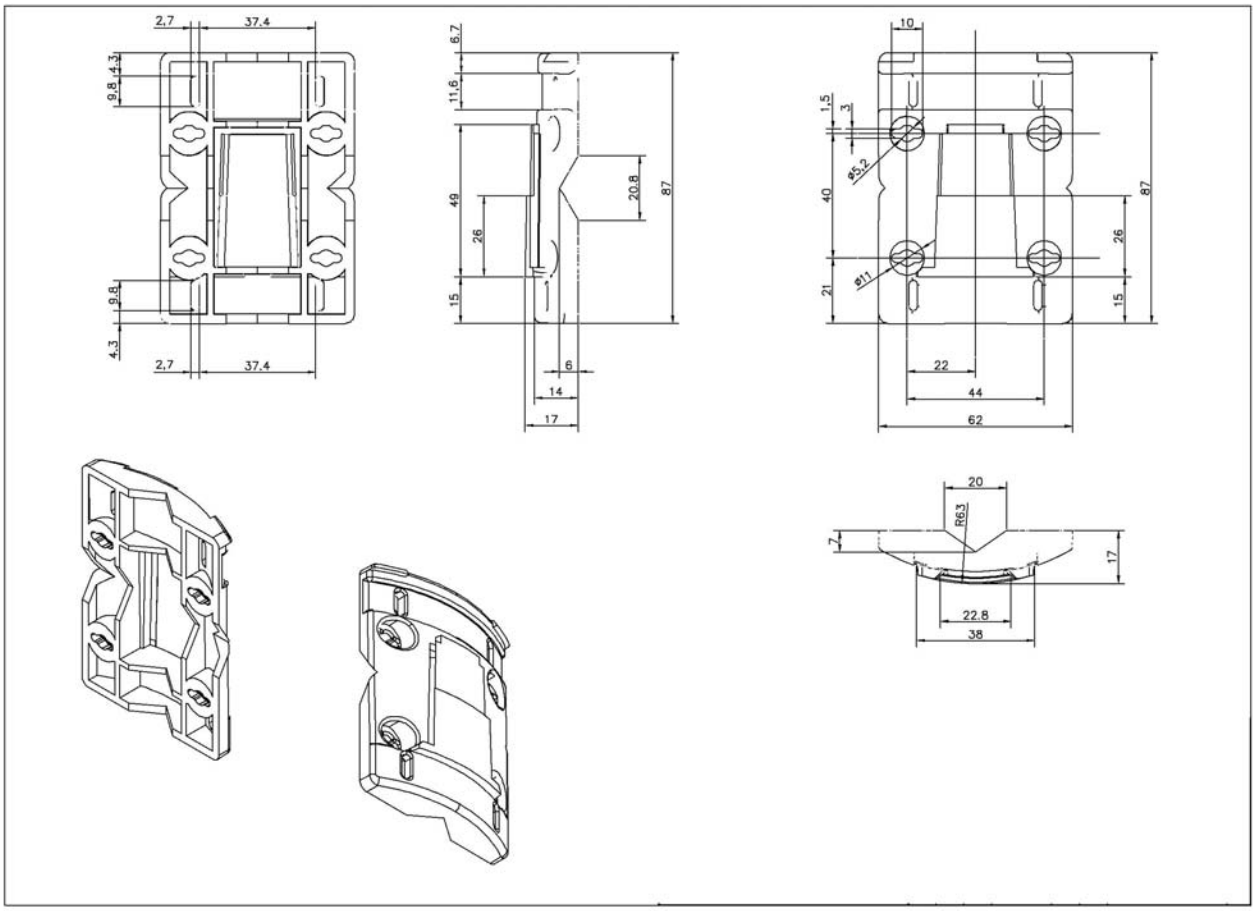


Figure 4 : Soleplate



2.2.2 Ambient conditions

The module is designed to operate in a temperature range of –20 °C to 60 °C

2.2.3 Electrical specifications

The module is powered by a 3.6 Volts, 2,25 A/hour lithium battery.

2.2.4 Radio specifications

The radio part of the module use the 915 Mhz frequency range.

3 RF TRANSCEIVER

3.1 Protocole RF

The objective of the present chapter is to describe the 915MHz low level protocole used for the Propane Trak project.
The restrictions are:

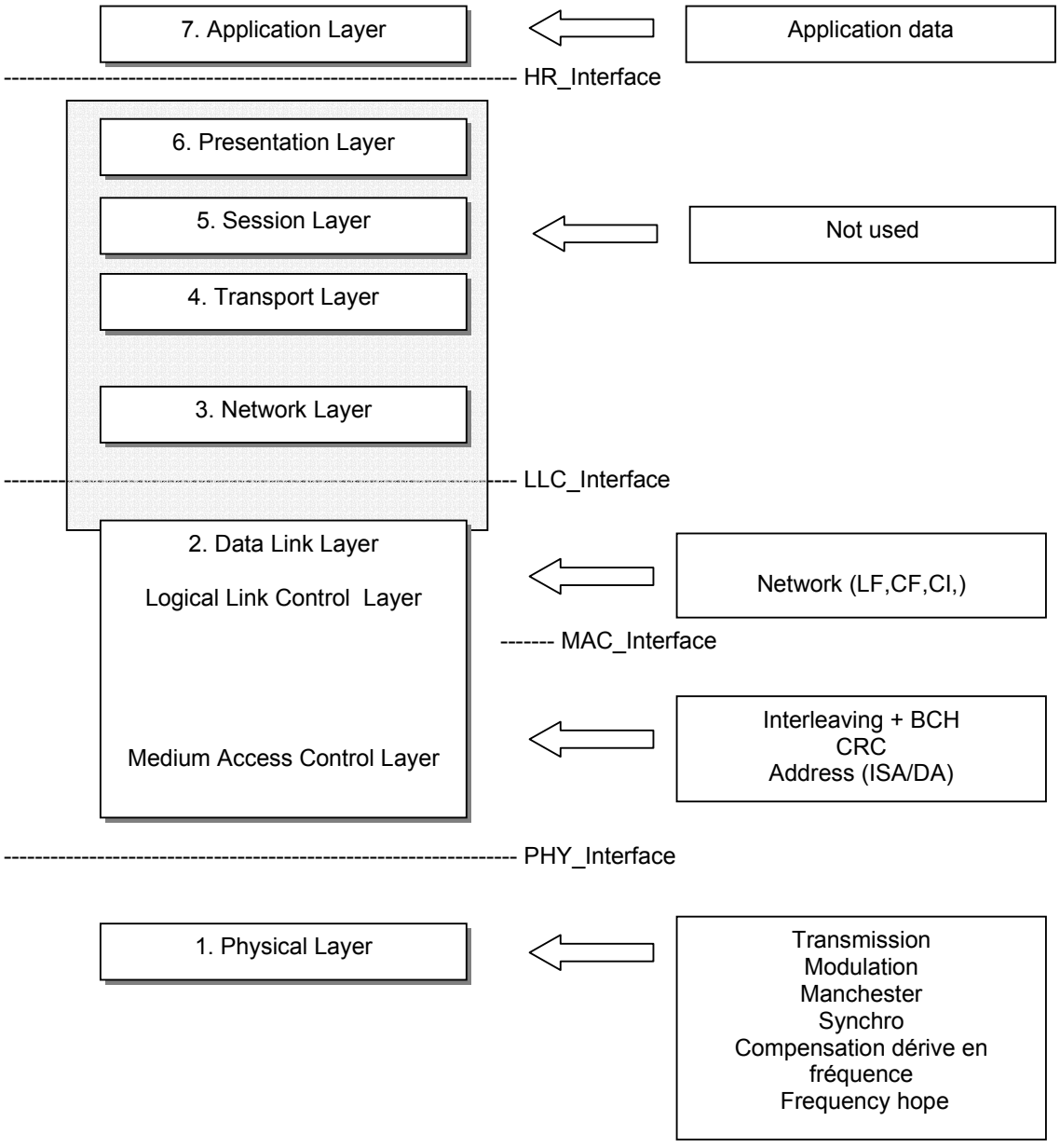
- FCC part 15
- Low power consumption
- MSP430 family
- ATMEL Transceiver
- Range 915 -> 921.3 Mhz

3.1.1 Presentation

At the physical level, the standard imposes an even radio power density distribution on the spectrum. The Frequency hope spread spectrum (FHSS) scheme was retained to achieve it.
The FHSS principal is:
Transmitting on one frequency for a certain time, then pseudo-randomly jumping to another, and transmitting again.
Also, the FHSS could counter-act interference by using different carrier frequency at different time. It's carrier will hop around within the band so that hopefully it will avoid the jammer at some frequencies.
To synchronize the transmission and reception frequency, in order to prevent lost data, a sync word has been inserted. Also, to assure completion of all the data, an algorithm of data interleaving and data correction have been implemented.

3.1.2 Structure

Simplified OSI structure:



3.1.3 Layer description

3.1.3.1 Physical layer

The physical layer assures the following:

- Modulation
- Manchester coding (average energy)
- Frequency hope
- Synchronization
- Compensation of frequency shift due to T° and aging

3.1.3.1.1 Frame structure

The frame is composed of 2 successive "sub-frame" of fixed length:

1/ Beacon sub-frame

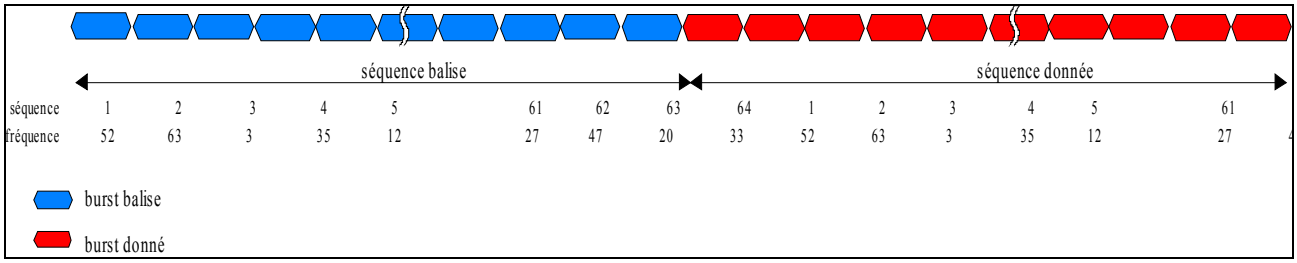
The beacon sub-frame is composed of 64 bursts. Each burst consists of 48 chips (24bits). And for each burst, there's a frequency hope ➔ 64 bursts for 64 frequencies.

The beacon burst is composed of a preamble and a long sync word

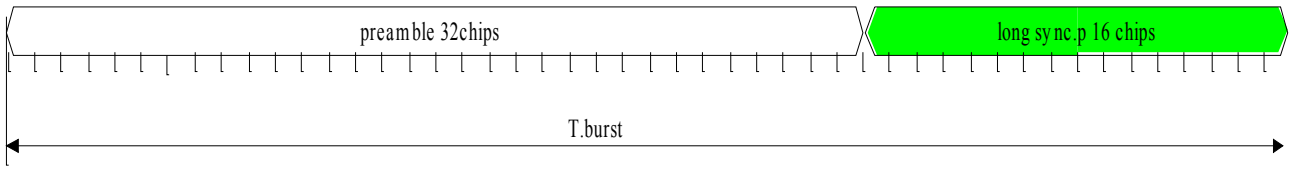
2/ Data sub-frame

The data sub-frame is composed of 64 bursts. Each burst consists of 48 chips (24bits). And for each burst, there's a frequency hope ➔ 64 bursts for 64 frequencies.

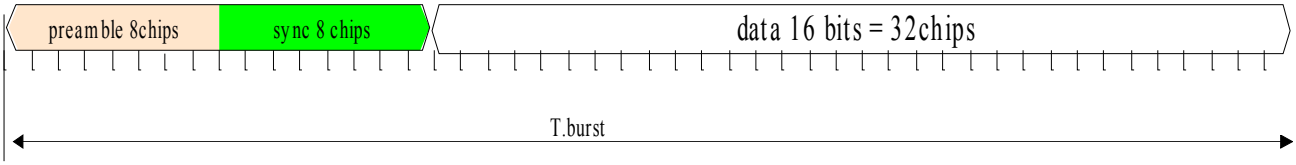
The data burst is composed of a preamble, short sync word and 16 bits of data.



Beacon Burst



Data Burst

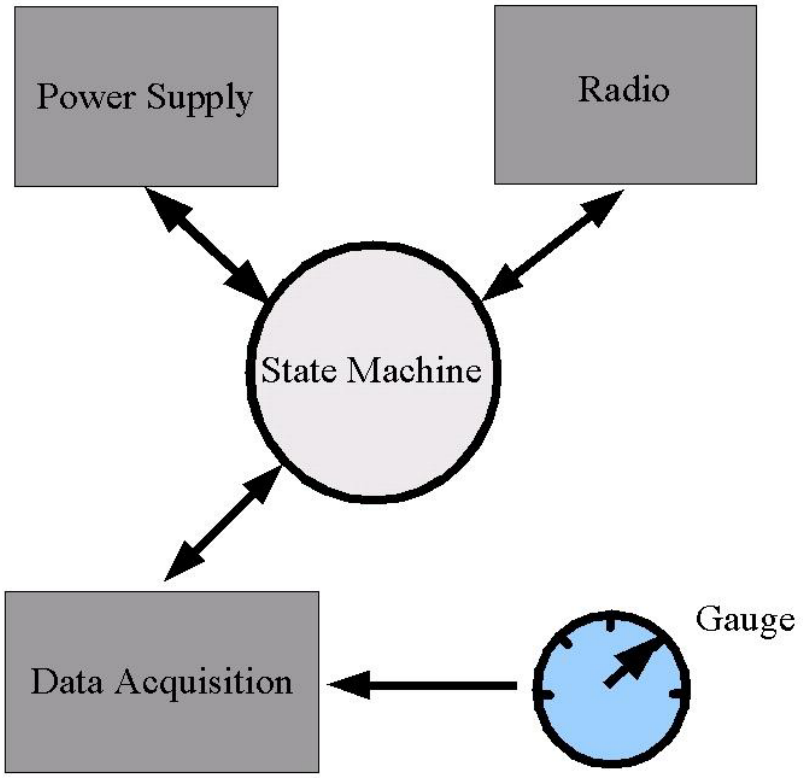


3.1.4 Hardware interface

The module is connected to the Rochester gauge by a 3 wire cable. The length of cable is 2 m.

3.2 Software specifications

Figure 5 : Software bloc



The principle of the software is to read the gauge every hour and to memorize the value. After 12 hours, the module activate the radio to send a data frame with the last 12 hours inside. After the system return to sleep for one hour waiting the time for the next measure.

4 INSTALLATION PROCESS

To install the module :

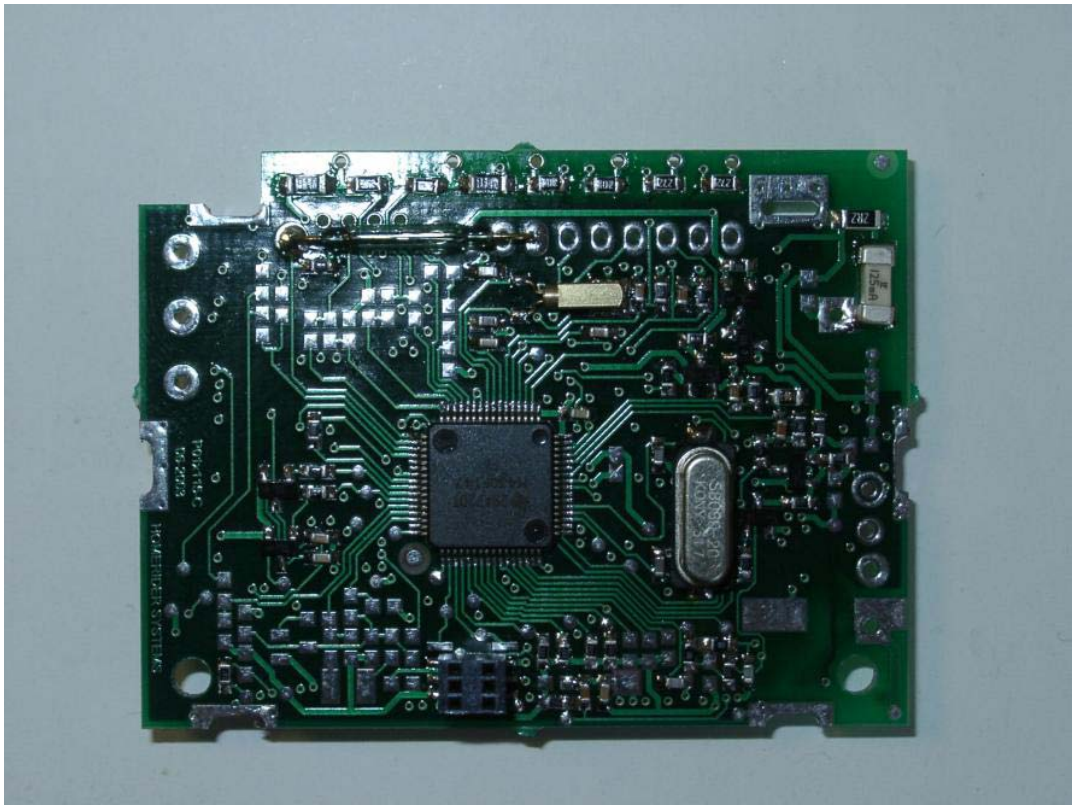
- ✓ Fix the soleplate on the wall with 2 or more screw.
- ✓ After having start the C@llRider® (see C@llRider® documentation)
- ✓ place the magnet during 6 to 10 second to generate an INSTALL data radio frame.
- ✓ Plug the module on the soleplate.

The installation is complete.

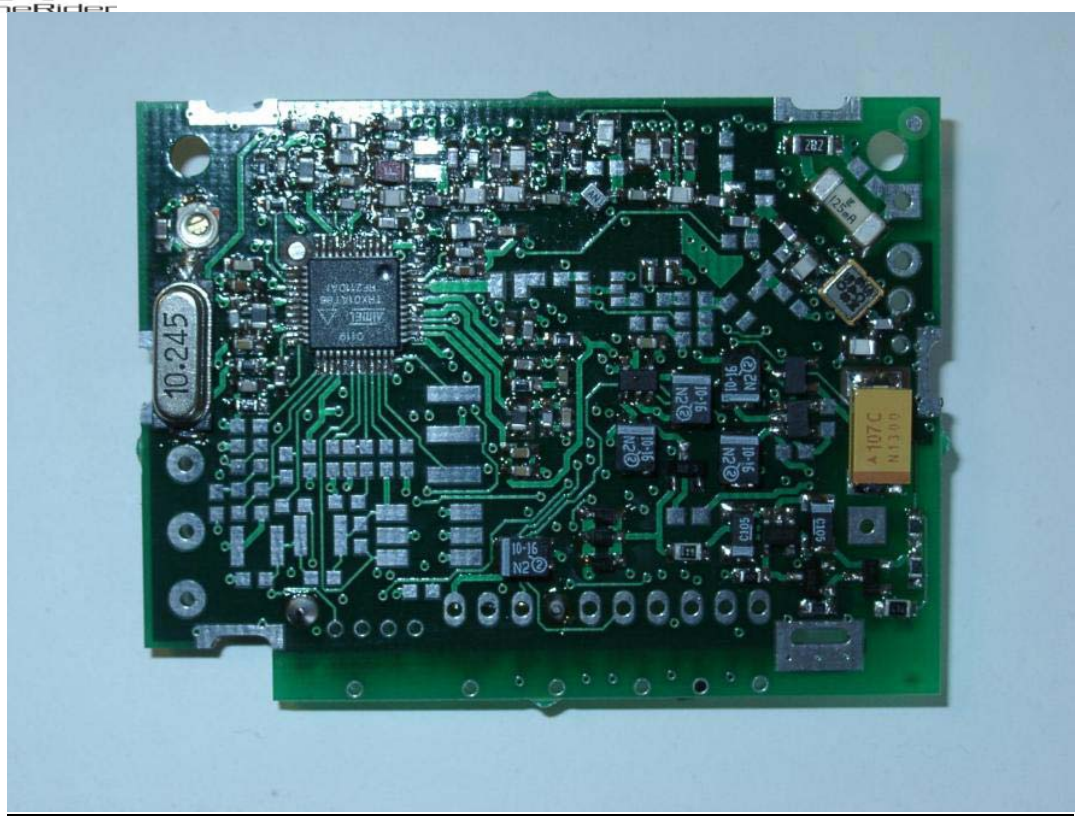
5 PRODUCTION INFORMATION

5.1 Components placement

PCB TOP



PCB BOTTOM



6 USER INFORMATION

6.1 Information to user.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

6.2 Labelling requirements.

This device complies with part 15 of the FCC Rules. 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