GEOLINK PRESENTATION

1.- COMPAGNY

1.1.- Main activity

French private company created in 1991, Geolink is now employing a total staff of 96 persons. The head office is located at Roquevaire, near Marseille, south of France. Main activity consists in satellites communications and navigation systems. Our agency in Paris is in charge of land field communication applications while Roquevaire manages the maritime field including both communication and navigations systems for Merchant, Fishery and Navy sectors. In connection with the maritime department, 12 agencies, spread over in main harbours all along the coast, represent our technical support for on board installations and services.

1.2.- Meteorological department birth

At the first beginning, 4 years ago, C.N.E.S. (French space launch center for "Ariane" rocket) published a tender to acquire a wind-finding system based on GPS radiosounding. As our engineers were already experts in GPS and radio, we submitted an application in spite of famous competitors participation such as AIR and Vaisala.
Finally, we won this tender and then we decided to carry on improvement and adaptation of the sonde to meet meteorological specifications (weight, dimensions, humidity sensor, price…etc.).
Geolink Meteorological Department has been actually created in 1998.

2.- REFERENCES

2.1.- Evaluations and tests

Our system has been evaluated by Méteo France and many demonstrations with comparison flights have been performed by others foreign Met Offices such as:

- UK Met Office (Beaufort Park)
- National Weather Service (Washington)
- Deutscher Wetterdienst (Lindenberg)
- Algerian Met Office (Alger)

Note: Météo France performed several evaluations in its laboratory at Trappes and also some tests in real conditions from a French ASAP ship.

In the near future, Geolink sondes will take part in the following inter-comparison campaigns:

• UK Met Office intercomparison	Camborne	Dec 00
• WMO intercomparison of GPS radiosondes	Brazil	May 01

2.2.- Equipments in operation

Scientific purpose
CNES 1 System

Military purpose
French Army: 1 System
French Air Force 3 Systems

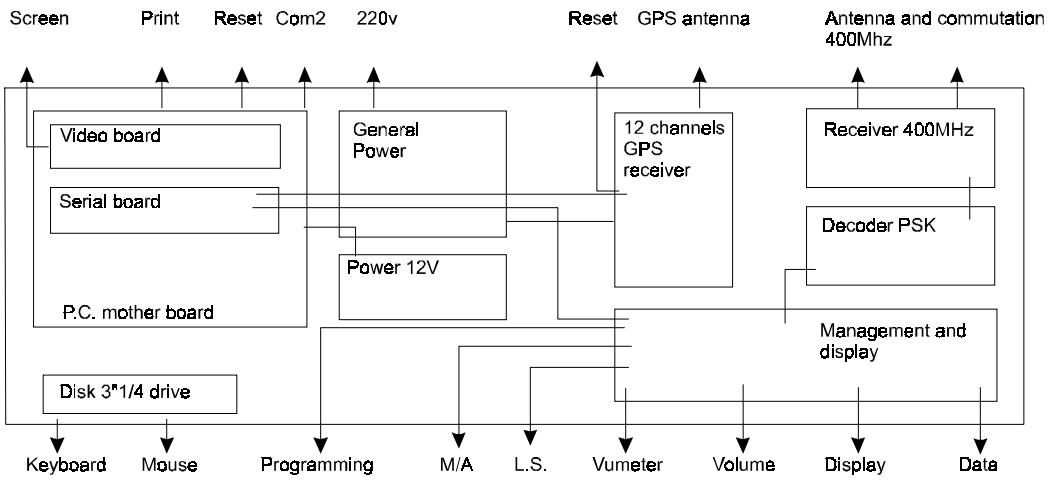
Meteorological network
At the time being, we have no system routinely operating in the WMO network.

3.- SYSTEM DESCRIPTION

3.1. – SR2K ground station

The station is mounted in a 19 inches case and consists of:

- 400Mhz radio receiver module
- 12 channel GPS receiver
- Telemetry decoder board
- Power supply (117-220v 50-60Hz)
- Management and display board
- PC mother board
- Hard drive disk
- 3’’1/4 drive
- Data acquisition software working under NT4 or NT5
- A graphic Module (Optional)



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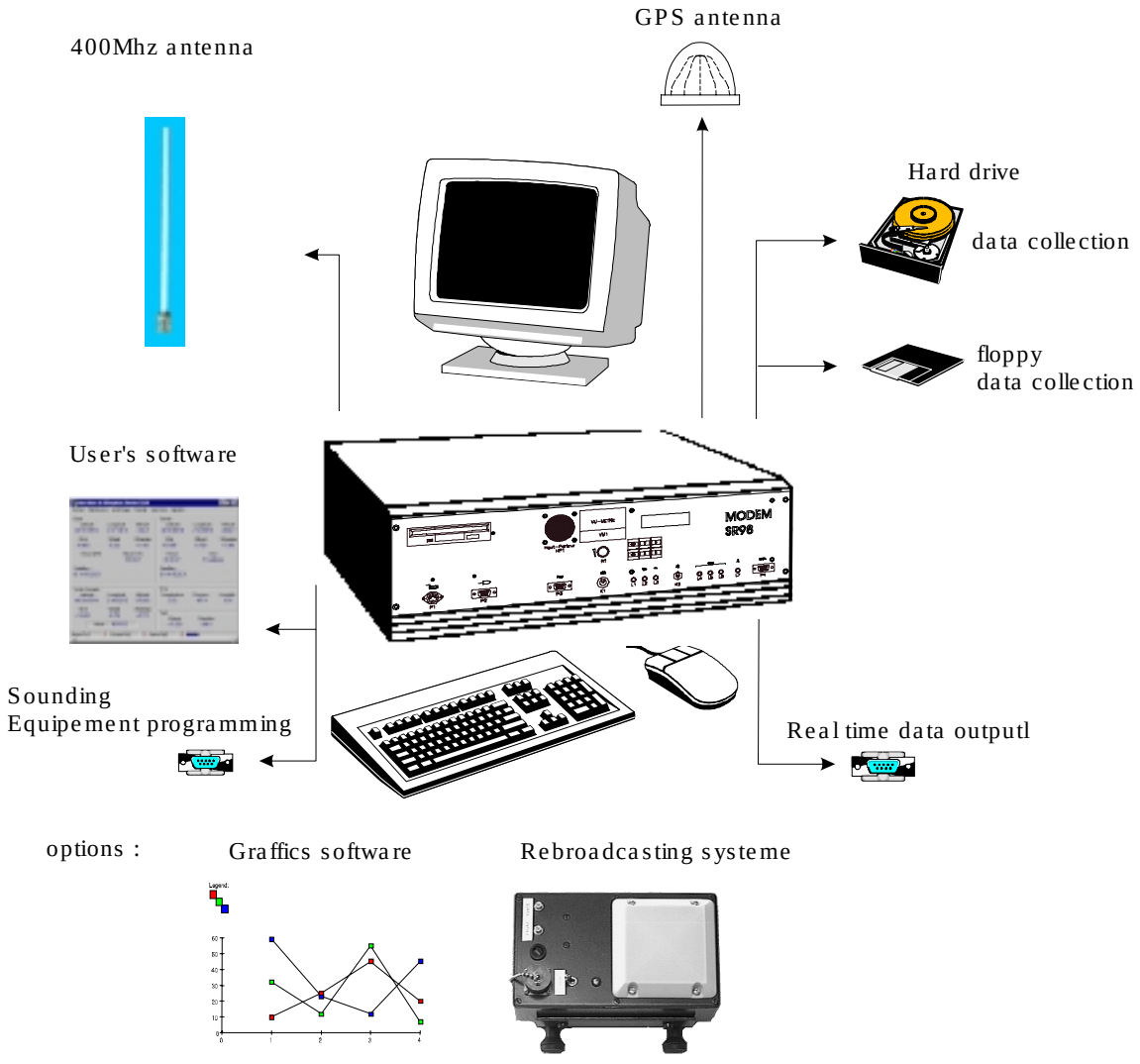
Peripherics connected to the SR98 :

- Display/ monitor
- Keyboard
- Mouse
- GPS antenna with 30 feet coaxial cable RG223U
- 400 MHz antenna with 30 feet coaxial cable
- Sondes transmitter programming interface

- Printer.(Option)
- GPS signals rebroadcasting system (Option)

Besides the registration and the storage of telemetry data on hard disk and 3 ” 1/4 disk the station provides a RS232 serial output allowing real time data processing, on a specific application like the calculator STAR of Meteo-France.



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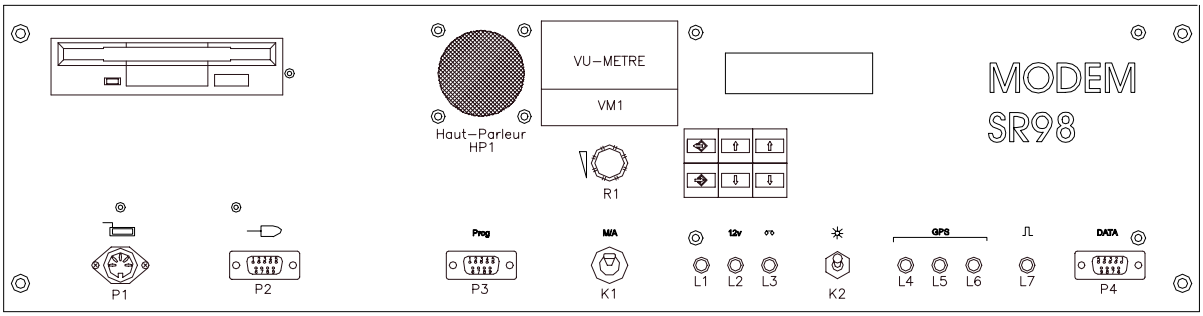
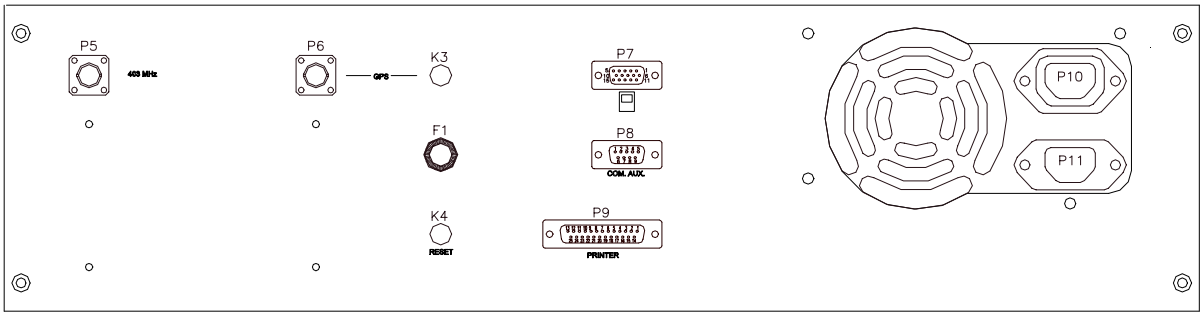
Front panel view:



Back panel view :



Low noise antenna amplifier :

Using low noise AsGa and MMIC technology, its position upright at the antenna in a weather-tight box gives optimum signal to noise ratio even with long cable runs.

Radio receiver module :

Double conversion synthesised Superhétérodyne.
Frequency coverage : 400 Mhz to 406 Mhz
Sensivity : 0,3 micro Volt for 10^{-4} B.E.R.
Selectivity : +/- 15 Khz at 3 dB
+/- 100 Khz at 70 dB
Stability 2ppm internal reference (TCXO)
Digital frequency display

Telemetry decoder :

This module is connected to the receiver output and unscrambles the various telemetry information to be processed later : calculated pressure, temperature, humidity, wind parameters.
The final calculation is made by the calculator STAR (Meteo-France).
The data output interface is a standard RS232.

GPS antenna :

Over ground plane with 26 dB gain L.N.A. The aperture of the turnstile antenna is wider and more regular than that of a standard patch antenna usually connected to a GPS receiver

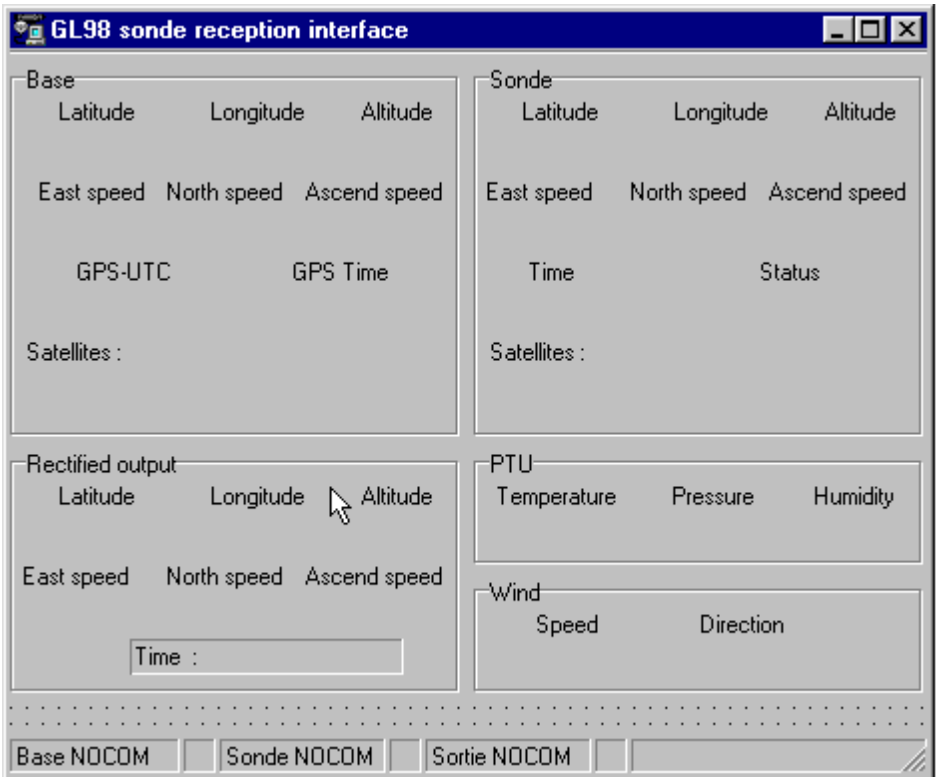
GPS receiver module:

12 channels receiver providing GPS data for differential correction.

In the 0 to 32 km zone the accuracy on the altitude is better than 10m and the resolution will depend on the observed layer. For information, it will be better than 1 meter for 50m layers with a balloon raising at 5 m/s.

Software :

A software is provided with the receiving station (under NT4 or NT5) for data acquisition. :



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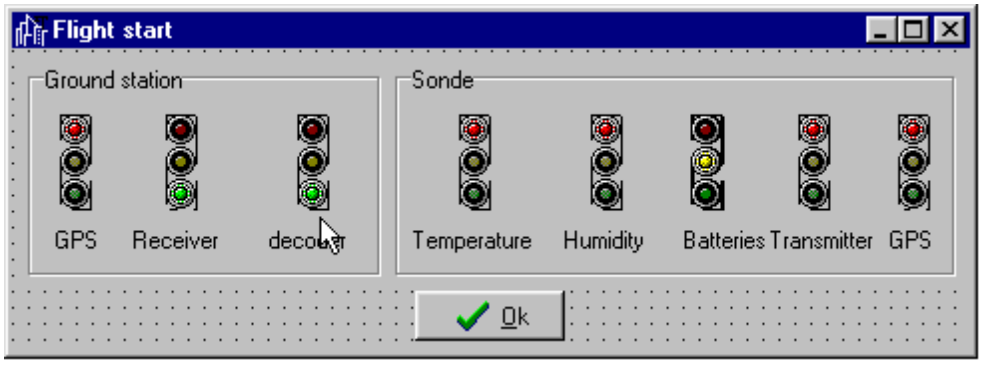
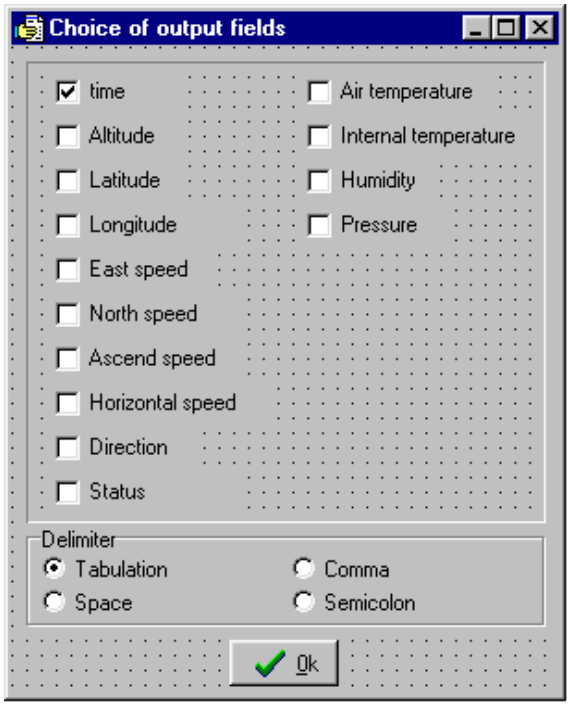
A special departure procedure shows the status of all parameters in the radiosonde transmitter insuring a safe launching of the balloon :



Thanks to this software it is possible to format data, that means to select fields to be recorded :



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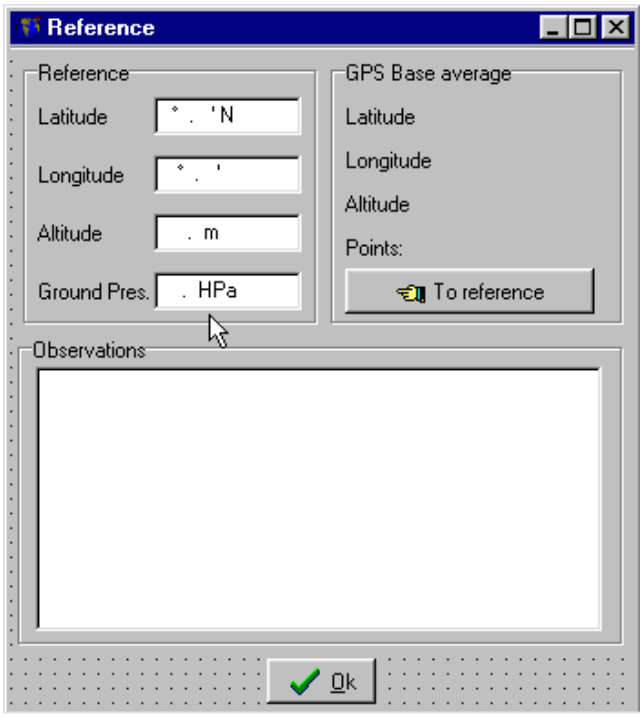
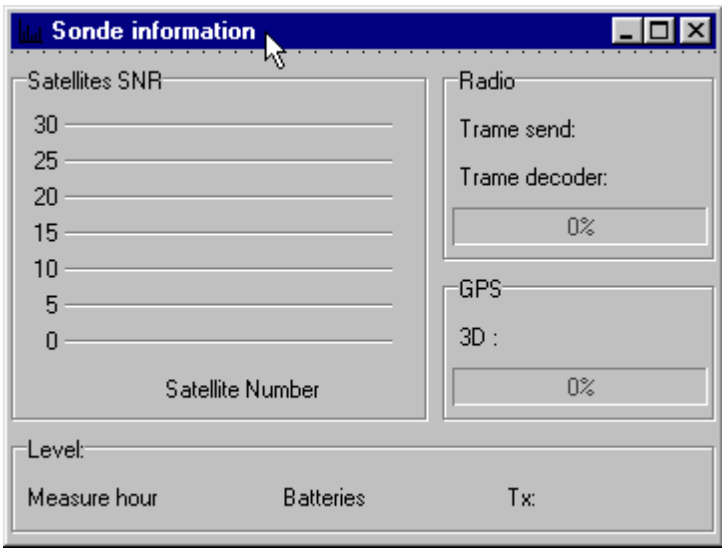
Ground station data may also be entered to initialise the differential station and the barometric equation



The software gives some statistical information about the flight :



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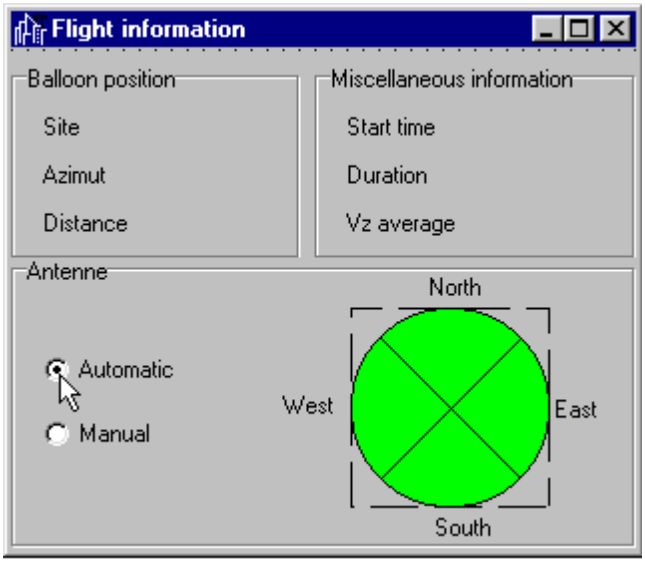
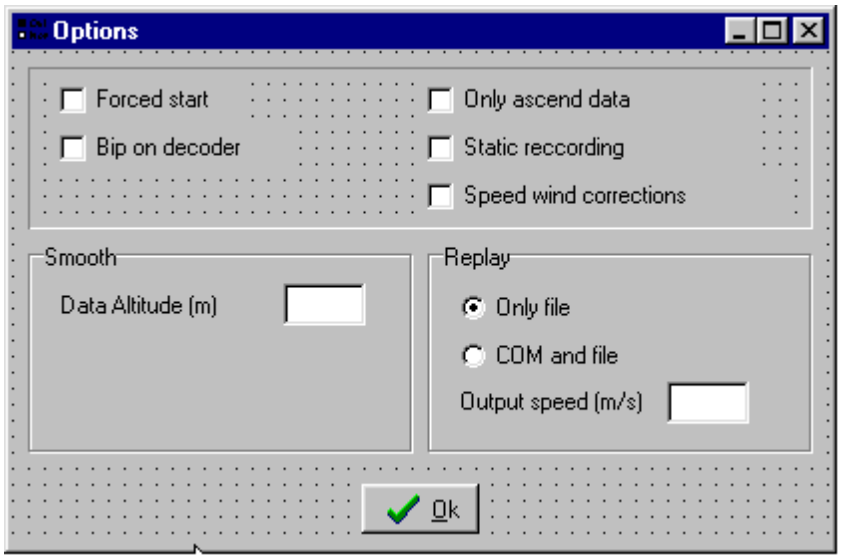
Information on the switching of the antenna allows to visualise the active antenna.



It is possible to record automatically either the whole flight, or the descent only :



Options :

GPS Rebroadcasting system :

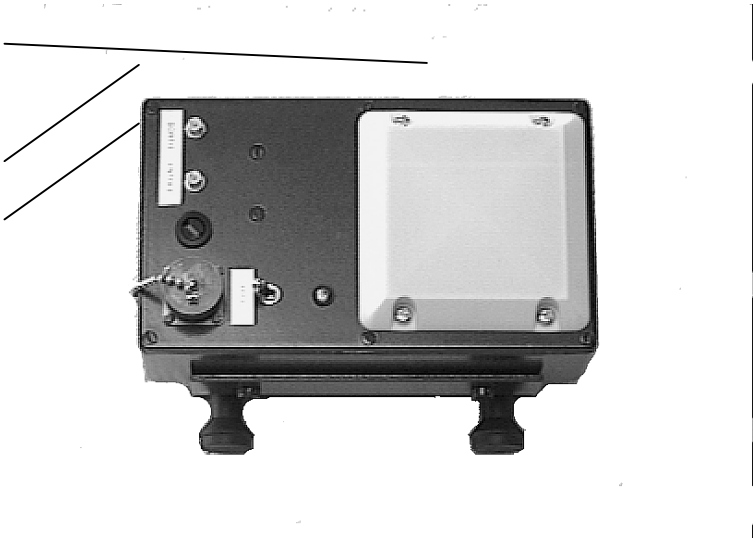
It allows the balloon GPS system to be initialised inside a building. This gives great ease in preparing the flight especially in bad weather conditions, its use is recommended

Technical features :

The outside antenna is a patch with 36 dB gain
The rebroadcasting antenna is a low loss patch

max. output -10 dBm

power supply 8-32 v 200mA max
On/off switch
led
190 * 110 * 65 mm



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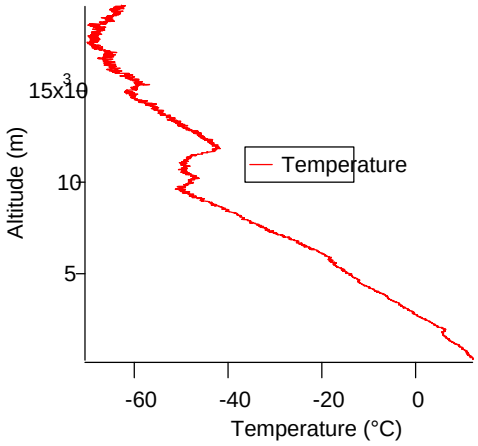
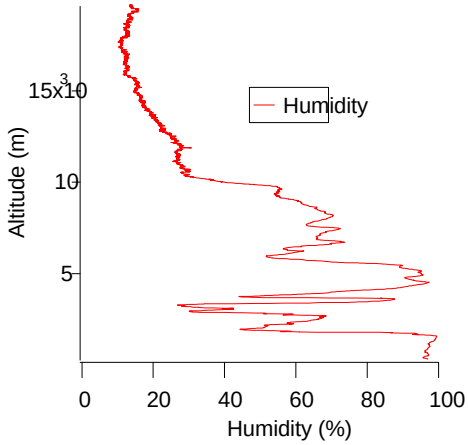
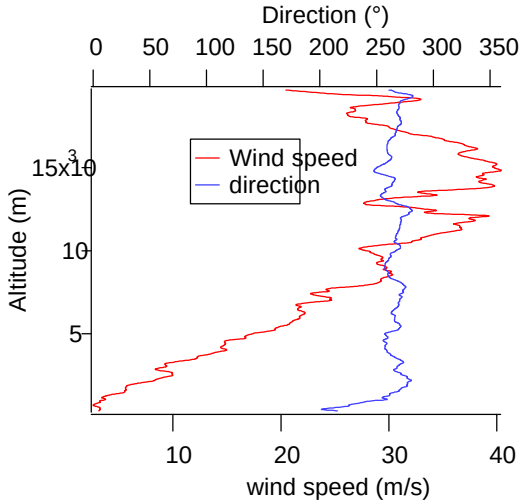
Graphic module

Software allowing to display data under graphic shape, for i.e. :







3.2.- Radiosondes PTU

This monobloc radiosonde is equipped with sensors allowing the different measurements and with a radio transmitter. Access to batteries and programming compartments is very easy

Pressure :
The pressure is calculated by the barometric equation from GPS altitude, temperature and humidity.

Humidity :
The humidity is measured by the help of a capacitive sensor whose capacitive value is proportional to the rate of relative humidity.

It consists of 3 fundamental elements :

- A basic substrate is an electrode
- A dielectric whose permissiveness varies with the relative humidity value
- A porous electrode is the second electrode of the electrical condensator. This porous electrode with a low response time is also an atmospheric filter.

Temperature :
The temperature is measured by help of a thermistor sensor.

Wind :
Components of the wind speed are measured by help of the GPS. Wind speed and direction are calculated from Doppler measurement. This gives an accuracy of 0,1 m/sec on the three axes with inverse differential correction.