

MODEM UPPER-AIR SOUNDING SYSTEM INNOVATION

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Abstract

Beyond SR2K2 receiving system, MODEM has introduced a new concept of low cost automatic launcher for Upper-Air meteorological station.

This new product so called RobotSonde has been developed according to following purposes:

- *Make operator task easier*
- *Reduce possibility of error and wrong handling during preparation/launch phase*
- *Increase percentage of successful soundings and available data on GTS*
- *Increase security of persons specially when hydrogen is used for inflating the balloon*
- *Facilitate staff management during out of normal working hours (Night or week-end)*
- *Reduce global running costs of sounding stations (possible reduction of global staff)*

1.- Introduction

Apart from performances aspect of the sounding equipment and radiosonde, it is not so easy to fully succeed a sounding. During the preparation and launch phase a lot of circumstances may interfere with soft progress of operation such as:

- Harsh meteorological conditions,
- Launch time in the middle of the night,
- Uncomfortable conditions for balloon train preparation due to basic equipment of balloon shelter, if any
- Dangerous or critical handling when using hydrogen gas for balloon inflation

Nowadays, sounding systems and radiosondes have radically changed in size, weight, performances and thanks to new technology Modem has developed a concept of low cost automated radiosonde launcher. The so called RobotSonde allows performing a maximum of 6 automatic unmanned soundings.

2.- Presentation

RobotSonde is composed of following subsystems:

- Launcher tube
- Shelter with separated technical and operator rooms
- Carrousel
- 6 individual removable containers of balloon train
- Electronic control unit



2.1- Preparation phase:

- Calibration of radiosonde sensors (ground check)
- Loading of the balloon train (radiosonde, unwinder, parachute, balloon) into individual containers
- Setup of sounding parameters (launch time schedule, inflation volume...)



2.2.- Automated functionalities

RobotSonde can be operated locally but full potential is given by using complete remote control capabilities

Primarily functions

- Radio bandwidth scan
Before powering on the sonde, the system perform a scan of the bandwidth in order to detect possible radio interference
- Power on the radiosonde
Battery pack is powered on through an infrared link (No connector or physical link)

- Frequency setup
According to scan result, the system setup the new frequency through an infrared link (No connector or physical link)
- GPS initialization
A GPS repeater provides GPS signals. The system monitors 3D initialization
- PTU Calibration check
The system load calibration data of the relevant radiosonde stored during the preparation phase and check coherence of PTU data
- Balloon inflation
The system monitors a flowmeter to inflate the balloon according to specified volume. Robotsonde is compatible with helium or hydrogen gas
- Balloon train release
Balloon is released at specified launch time
- Data acquisition
Data acquisition and storage during the flight
- Transmission of messages (TEMP, BUFR...)
- At the end of the sounding, the system will send formatted messages to the GTS

Secondary functions

- Re-launch of a new radiosonde
In case of incident before balloon release or failure during the flight, the procedure will restart for a new sounding
- Possible immediate launch
At any time, an immediate start of the launch procedure can be initiated by an operator (local or distance)
- Stock control of radiosondes on the carousel
Priority is based on date of loading
- Control of Gas consumption
The system can monitor a couple of gas racks
- Log of events
- Daily report
- RobotSonde is fully compatible with already installed MODEM sounding systems

3.- Conclusion

RobotSonde is different from existing systems since it is not dedicated to long operation at remote locations but, considering its affordable cost, rather to be installed on all upper-air sites offering flexibility and a better use of resources.