EXPENDABLE DIGITAL RADIOSONDE MODEL XDR-928

BULLETIN XDR-928

General Description

The XDR-928 Expendable Digital Radiosonde represents the state-of-the-art for making precise upper air observations using high resolution Global Positioning System technology. The XDR is unique in that it is capable of radiosonde *and* dropsonde sounding modes, providing vertical profiles of pressure, temperature, humidity and 3D winds. It can be released manually, deployed in the Model ARL-9000 launcher, or released via UAV.

The XDR-928 features a precision calibrated, radiation-shielded thermistor and solid state micro-machined (MEMS) humidity sensor, providing exceptional calibration and stability. Pressure is derived via GPS altitude, while wind data a 12 satellite GPS engine. An optional pressure sensor is available to support hurricane work. Digital RF data telemetry in the 403 MHz meteorology band communicates to a METHUB or AIRHUB Receiver. A web browser displays sounding data via a conventional Skew-T graph, or as text data reports.

Features

- Highly integrated for low cost and high reliability
- Advanced micro-machined met sensors
- True GPS engine for precise wind finding
- Non-encrypted data transmission
- Environmentally-friendly design
- Uses common lithium type 2/3A dry cell battery
- Non-contact battery activation
- Compatible with ARL-9000 Auto Launcher

Applications

- Synoptic meteorological upper air soundings
- Hurricane tracking via research aircraft or UAV
- Numerical Weather Prediction model input
- Climate research field experiments, education

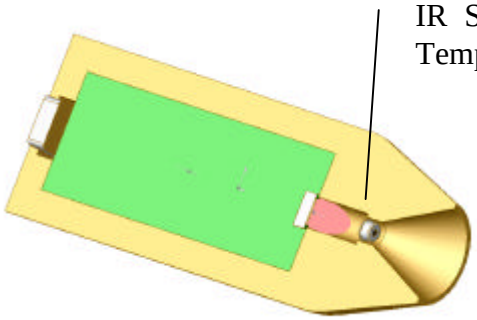
Principle of Operation

A radiosonde is an electronic met sensor package released into the atmosphere, typically attached to a balloon filled with helium. In dropsonde mode, it is deployed from aircraft (via ECM chaff dispensers) or UAV. During ascent (or descent for dropsondes), it telemeters PTU meteorological data and winds data in real time once a second. For radiosonde soundings, a METHUB Meteorological Data Receiver, located on the ground records the data. The AIRHUB supports either radiosondes or dropsondes from aircraft or UAV. The XDR allows you to migrate to automated upper air flight operations, using the same hardware/software.

XDR-928 Expendable Digital Radiosonde

Unlike older radiosondes that used water-activated batteries, the XDR-928 uses commonly-available lithium dry cell battery technology. The battery is activated by a slip-fit fiber optic cable. Prior to release, the fiber optic cable latches the battery on and real time data telemetry commences until the end of the flight. (A manual jumper allows battery deactivation if necessary.) Each second a Manchester-encoded data packet is sent via frequency shift keying (FSK). Met sensor calibration coefficients are sent once a minute, eliminating the overhead of paper tapes, and a cyclical redundancy check is appended to each packet to ensure RF link integrity. During flight, received upper air data are displayed in real time via a web server, allowing sharing of data via TCP/IP networking. Data are stored in a database, and can be exported in a variety of formats or as ASCII.

The XDR is compatible with both the ARL-9000 auto launcher and AIRHUB for UAV hurricane work. When used with the ARL launcher, the roof is opened and the helium gas line is cut, whereupon the sonde is lifted up and away. When used with UAV, soundings initiate on pressure drop.



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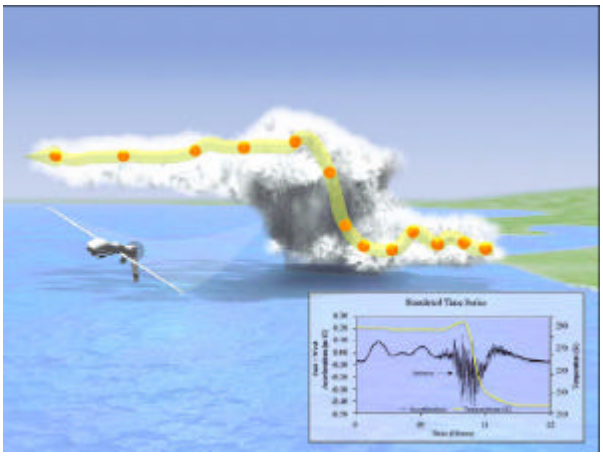
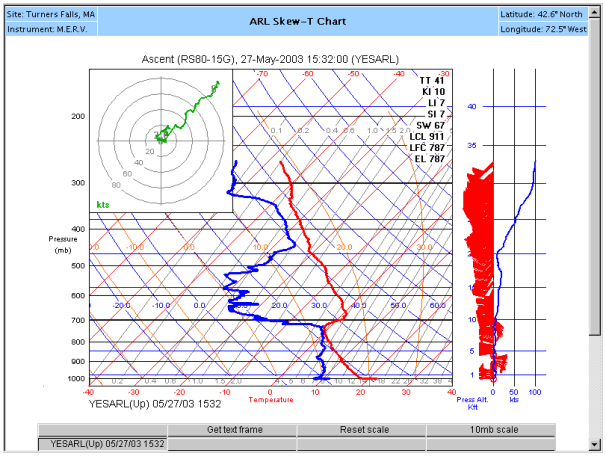
Automated XDR Deployment Methods

Deployment from ARL-9000 launcher



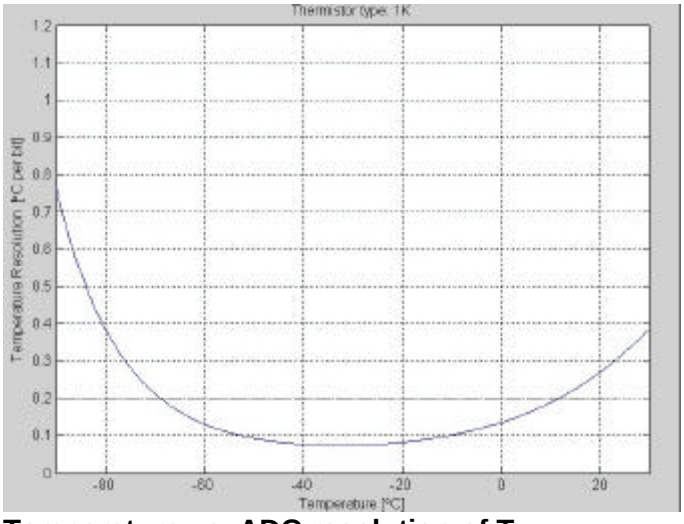
Dropsonde deployment from a UAV



Typical Skew-T data sounding display

Specifications

Power	Lithium type dry "2/3A" battery
Weight	100g (w/o battery)
Dimensions	4"W x 8"L x 4"H (folded)
Winds	12 Satellite, true GPS engine, winds updated 1 Hz (4 Hz opt)
Pressure	Type: Calculated via GPS Alt. (MEMS pressure option avail) Range: 150-1150 hPa Accuracy: calculated; ±15 hPa
Temperature	Type: Thermistor Range: -100°C to +50°C Accuracy: ±0.14°C @25°C Resolution: 10 Bit ADC
Humidity	Type: MEMS Range: 0-100%RH Accuracy: ±2% @25°C Resolution: 8 bit ADC
Sea Surface Temp	Type: IR, ±0.4°C @25°C (opt.)
Sampling Rate	One data record per second; (4Hz wind option available)
Data Transmission	Digital Manchester encoding, 4800 Baud Freq: 403.1-405.9 MHz Nominal output: ≈100 mW Modulation: FSK FM
Data Channels	Up to 8 simultaneous, selected via internal DIP switch



Temperature vs. ADC resolution of $T_{ambient}$

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