anasphere

Analytical and Atmospheric Instrumentation

The AnaSonde™ family of digital radiosondes has been developed as a user-friendly and low cost method for gathering scientific measurements in the lower atmosphere up to altitudes of approximately 30,000 feet. AnaSondes feature a modular sensor suite that can be customized by the user, including simple interfaces for the user-added sensors. Digital data, which can be raw sensor measurements or processed values can be transmitted by the AnaSonde-3M either in Morse code (for over-the-air applications) or as ASCII data through its on-board serial port. Presently, all AnaSondes operate in the 70-cm amateur radio band and an amateur radio license is required to use their transmitters. AnaSonde signals are received using inexpensive amateur radio receivers.

Technical Details:

The AnaSonde-3M is a multipurpose variant of the AnaSonde family. This radiosonde features seven 10-bit analog-to-digital converter channels with 0-5 volt DC inputs (referenced to the regulated 5 volt supply voltage) and one frequency-counting channel which measures frequencies up to 25 kHz with 1 Hz resolution. A 10 milliwatt AM transmitter at approximately 434 MHz transmits data at regular intervals. With pressure, temperature and humidity sensors, it has a mass of 15.0 grams. The circuit board is 0.85 x 3.25 inches.

Data Processing and Output:

The major changes between the AnaSonde-3M and its predecessor, the AnaSonde-M, are found in the firmware that operates the AnaSonde and in the data output options. The AnaSonde-3M outputs data in decimal format; the data can be raw sensor data or it can be processed on-board to yield final measurements. The data output can be either Morse code (if using the radio transmitter) or ASCII via the on-board serial port. All of these options can be configured by the user. The call sign (required when transmitting data over the air) is also programmable by the user. The AnaSonde-3M can be reconfigured using HyperTerminal or the associated SondeWorks-3M software which automates the reconfiguration process as well as logging and graphing data.

Supplied Items:

The AnaSonde-3M can be ordered as a kit or preassembled. Every AnaSonde comes complete with everything needed for flight except for a 9-Volt battery and helium for the balloon. Sensors specified by the user are included with the kit. Pressure, temperature and humidity sensors are all available as standard options. ***Specialized sensors can be available from Anasphere upon request.***
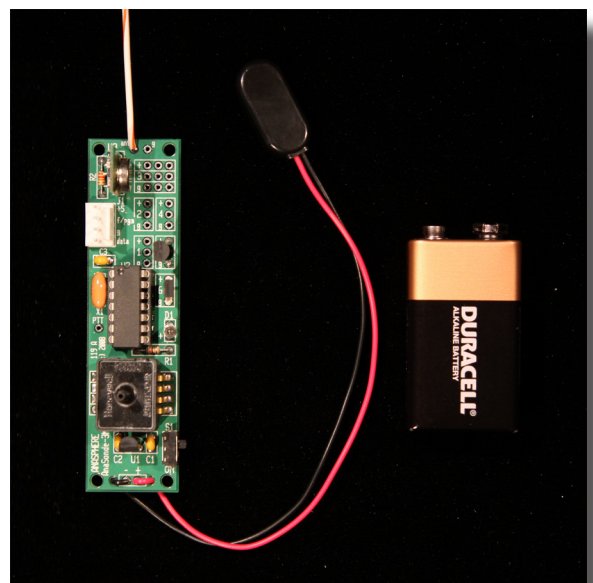
Additional Specifications:

Programming Cable:
The AnaSonde-3M requires a small serial adapter cable (available from Anasphere or easily assembled) to implement user reprogramming and ASCII output features.

Data Format:
Data format is fully user-configurable and a separate document details this process. The associated SondeWorks-3M software automates the configuration process.

Data Rate:
The default rate is one set of measurements approximately every 15 seconds. This delay is fully user-adjustable from approximately 1 second to as long as 65 seconds.

ASCII Data:
The ASCII output can run at 300, 1200 or 9600 baud. Polarity can be inverted depending on whether or not the signal is routed through a driver prior to going to an associated computer. The user can adjust these values.

Receiver:
Any amateur radio receiver or scanner capable of AM reception in the 70-cm amateur band will be suitable for receiving AnaSonde-3M Morse code signals. We recommend buying a receiver with CW capability for compatibility with future upgrades. For best range, a directional antenna such as Yagi is very highly recommended.

User-Provided Materials:
The user will need to provide a 9-volt battery and helium to fill the balloon. An alkaline 9-volt battery will work, but improved performance can be attained with lithium batteries. A soldering iron and solder are required if using the kit version.

Software and Documentation:
All software required for computer reception and processing of AnaSonde data is provided on our website www.anasphere.com. A manual covering assembly, extra sensor installation and signal processing is also available on the website.

Sensors:
The AnaSonde-3M can carry any combination of seven 0-5 volt DC analog-output sensors, the only limit being that only one pressure sensor may be accommodated on the circuit board. The frequency input accepts a 5-volt square wave.

Measurement Precision:
Voltages are measured in 4.9 mV increments and frequencies are measured in 1 Hz increments. For Morse code and ASCII transmissions, each measurement is truncated to the nearest 1° C, 1% RH, 1 mb, 1 mV or 1 Hz. Raw sensor signal outputs in either format are in the range of 0-1023 (from the 10-bit ADC).

Range/Altitude Performance:
The altitude from which signals may still be received is highly dependent upon several factors. The slant range to the balloon, the type of battery, temperatures encountered and their effects on battery performance, data transmission format and speed as well as receiver equipment will affect the range.

Representative Performance:
Typical slant ranges that have been demonstrated on numerous launches of the AnaSonde-E and AnaSonde-3M models have been on the order of 12-15 miles. Telemetry has been received from altitudes over 30,000 feet. A typical receiver setup uses a Yaesu VR-120D receiver coupled with a Cushcraft A430-11S 11-element Yagi antenna.

Ordering Information:
You'll need the following to order an AnaSonde: amateur radio call sign and any standard sensors you want (pressure, temperature or humidity).

About Anasphere:
Anasphere was founded in 2002 to pursue the development of miniature instruments for atomospheric research. Trace gas sensors and meteorological sensor systems are major areas of company activity. Many of Anasphere's sensors are designed for use on sounding balloons and small UAVs.

Anasphere's customers include the federal government, the private sector and educational institutions. Revenues come from a combination of R & D and instrument sales.