



*Analytical and Atmospheric Instrumentation*

# AnaSonde-E

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 is processed into plain text measurements for transmission to the ground as Morse code. Presently, all AnaSondes operate in the 70-cm amateur radio band and an amateur radio license is required to use them. AnaSonde signals are received using inexpensive amateur radio receivers.

## Technical Details:

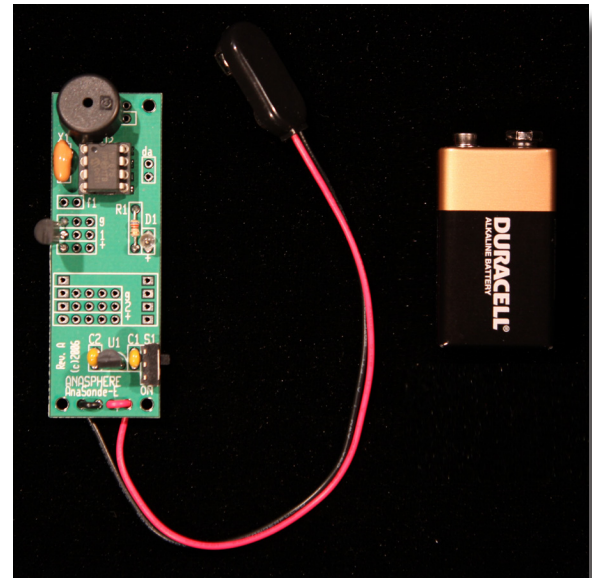
The AnaSonde-E represents the most economical variant of the AnaSonde family. This radiosonde features two 10-bit analog-to-digital converter channels with 0-5 volt DC inputs (referenced to the regulated 5 volt supply voltage) and one frequency-counting channel which measures frequencies up to 25kHz with 1 Hz resolution. A 10 milliwatt AM transmitter at approximately 434 MHz transmits data at regular intervals. With pressure and temperature sensors, it has a mass of 13.1 grams. The circuit board is 0.85 x 2.5 inches.

## Data Output:

The AnaSonde-E is configured to transmit its measurements entirely via Morse code. Users with Morse code skills can receive telemetry by ear! Alternatively, a shareware program can be downloaded to decode the transmissions. A companion piece of software developed by Anasphere allows the user to seamlessly process the data as it is received. However, users will find that decoding by ear will yield the best results for long range work - this can lead to a fun contest for your ham radio club!

## Supplied Items:

The AnaSonde-E 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. Please contact us with your needs.***

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## **Additional Specifications:**

### **Transmitter:**

The AnaSonde-E uses a 10 milliwatt AM transmitter operating at approximately 434 MHz.

### **Data Format:**

Digital data is processed into plain text measurements for transmission to the ground as Morse code. The call sign of the operator is also periodically transmitted in Morse code.

### **Data Rate:**

The Morse code version transmits measurements once every 30 seconds. Other rates may be available upon request.

### **Receiver:**

Any amateur radio receiver or scanner capable of AM reception in the 70-cm amateur band will be suitable for receiving AnaSonde 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](http://www.anasphere.com). A manual covering assembly, extra sensor installation and signal processing is also available on the website.

### **Sensors:**

The AnaSonde-E can carry any combination of two 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 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 atmospheric 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.