

## **MEP Supplier Scouting Opportunity Synopsis 2023-031**

**Item to be Scouted:** Radiosondes

**Please describe the item application/ the end use of item.**

National Weather Service (NWS) radiosondes for the NWS Upper Air Network radiosonde observing system. See attached equivalent specs for this item. The specified radiosonde tracking systems are used at the entire Manual Radiosonde Observing System (MROS) network and the only radiosondes that will operate with these tracking systems are the radiosondes manufactured specifically to interface with the accompanying tracking systems. NOAA is looking for a device that can interface with current systems.

### **1. Supplier Information**

- a. **Type of Supplier being sought:** Manufacturer
- b. **Reason for scouting submission:** 2<sup>nd</sup> Supplier

### **2. Summary of Technical Specifications and performance Requirements:**

- a. **Describe the manufacturing processes (elaborate to provide as much detail as possible)**

Electronic and mechanical assembly.

#### **b. Provide dimensions / size / tolerances / performance specifications for the item**

Dimensions Body (L x W x H): 155 x 63 x 46 mm Sensor boom bent (L x W x H): 282 x 63 x 104 mm. Weight 80 g. Transmitter type Synthesized Frequency band 400.15 – 406 MHz Tuning range 400.16 – 405.99 MHz Maximum transmitting range Up to 350 km Frequency stability, 90 % probability  $\pm 2$  kHz Deviation, peak-to-peak 4.8 kHz Emission bandwidth According to EN 302 054 Output power (high-power mode) Min. 60 mW Sideband radiation According to EN 302 054 Modulation GFSK Data downlink 4800 bit/s Frequency setting Wireless with ground check device

**c. List required materials needed to make the product, including materials of product components**

See attached

**d. Are there applicable certification requirements?**

See attached specifications

**e. Are there applicable regulations?**

See attached specifications.

**f. Are there any other standards, requirements, etc.?**

See attached specifications. The radiosonde shall have at least one NOAA Symbol, height not less than 2.5 cm and can be monochromatic. The NOAA symbol shall be located on the radiosonde side opposite of the temperature sensor or as negotiated with the Government.

**g. Additional Comments: Is there other information that would impact the item's performance or usefulness? Please explain.**

All radiosondes shall be identical in all respects, including pressure, temperature, and RH sensors, transmitters, GPS receiver, associated circuitry and processing algorithms, and physical characteristics.

The radiosonde shall be calibrated prior to government delivery.

The radiosondes shall function under the following range of radiosonde operating conditions:

- Air Pressure: 2.0 hectopascals (hPa) to 1070.0 hPa
- Air Temperature: -95.0 oC to +50.0 oC
- Air RH: 0.0 % to saturation
- Wind vector: -165 meters per second (m/s) to 165 m/s
- Hydrometeors (liquid and frozen precipitation): 0.25 millimeters (mm) per hour to 300.00 mm per hour
- Ascent Rate: -9.0 m/s to +9.0 m/s
- Altitude: -50.0 m to 38.0 km, MSL
- Solar Radiant Flux: 0.0 to 1358.0 Watts per meter<sup>2</sup> (W/m<sup>2</sup>)

**3. Volume and Pricing**

**a. Estimated potential business volume:** 19,296 units per year

**b. Estimated target price/unit cost information:** \$125.00 per unit

**4. Delivery Requirements**

**a. When is it needed by?** 60 days ARO

**b. Describe packaging requirements:**

- 3.1.11 The radiosonde packaging shall maintain the integrity and safety of the radiosonde throughout the life of transport and circulation throughout the inventory system, so that at its ultimate destination the radiosonde is operationally functional and undamaged. Each carton/case and outer containers shall contain a bar-coded label containing the Agency Stock Number (ASN) and National Stock Number (NSN) numbers for a radiosonde box.
- 3.1.12 Each carton/case and outer containers shall also be labeled with contract number, manufacturer's name, date of manufacture, for example see
- 3.1.13 A packing list with serial numbers and secured to the outer most container either within a clear, plastic shipping envelope or affixed, shall be provided with each shipment of radiosondes to a destination.
- 3.1.14 The entries to be shown on the packing list shall be specified by the Contracting Officer prior to the first shipment.
- 3.1.15 Sufficient desiccant shall be packed in each sealed container to prevent condensation of entrapped water vapor at low temperature.
- 3.1.16 The desiccant shall be packed in a sturdy, spill-proof package and not contaminate any part of the radiosonde.
- 3.1.17 A serial number shall be securely applied to the outside of the casing for easy viewing.
- 3.1.18 The serial number shall consist of not more than 12 characters (numerals and letters).
- 3.1.19 The preferred format of the serial number is YYJJJ-XXXXXX, with YY - calendar year, JJJ - Julian Date (1-366), and XXXXXX - sequential ID# (000001 to 999999).
- 3.1.20 All lettering shall be permanent and impervious to liquid and moisture (i.e. weatherproof). The preferred lettering remains readable for at least 6 months when exposed to operational conditions.
- 3.1.21 The battery compartment shall be designed to prevent leakage from the battery compartment to the exterior of the radiosonde and of gases onto any of the radiosonde electronics or sensors during preparation, installation, flight, and on the ground after flight termination.

**b. Where will this item be shipped?**

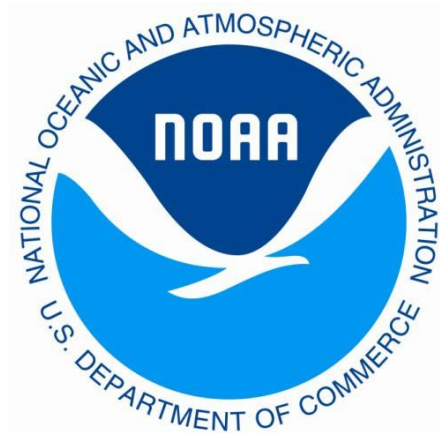
NATIONAL LOGISTICS SUPPORT CENTER  
14200 MERRITT ROAD  
GRANDVIEW MO 64030

**5. Additional Comments:**

Is there other information you would like to include?

Please see attached MROS Specification for more detailed specifications.

**SPECIFICATION  
FOR  
National Weather Service (NWS)  
RADIOSONDES  
(Acquisition Sensitive)**



DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE  
OFFICE OF OBSERVATIONS  
1325 EAST WEST HIGHWAY  
SILVER SPRING, MD 20910

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## 1.0 SCOPE

This specification defines the requirements for the National Weather Service (NWS) radiosondes for the NWS Upper Air Network radiosonde observing system.

## 2.0 APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. In the event of conflict between the documents referenced herein and this specification, the contents of this specification shall be the superseding requirement.

### 2.1 Government Documents

Reference No.	Title
NWSM 10-1401	National Weather Service Manual (NWSM) Operations and Services Upper Air Program National Weather Service Policy Directive (NWSPD) 10-1401; Rawinsonde Observations, dated June 2010
FAA Regulations Title 14 CFR, Part 101	Federal Aviation Administration (FAA) Regulations Title 14 Code of Federal Regulations (CFR), Part 101: Moored Balloons, Kites, Amateur Rockets and Unmanned Free Balloons
FCM-H3	Federal Meteorological Handbook, No. 3

Copies of the National Weather Service Manual 10-1401 are available from the NWS Upper Air Observations Program at <https://www.weather.gov/upperair/>.

### 3.0 REQUIREMENTS

#### General

This specification defines the requirements for the NWS radiosondes. Whenever a specific paragraph of this specification is referenced, all subparagraphs of the referenced paragraph also apply. The usage of the term “shall” implies a mandatory requirement, whereas the usage of the terms “preferred” implies a non-mandatory requirement.

#### Radiosonde Description

The radiosonde is a lightweight all-weather instrument. The radiosonde measures or derives atmospheric pressure, temperature, relative humidity (RH), wind speed & direction, and determines three-dimensional position (latitude, longitude and altitude) after ground preparation and during flight. The radiosonde includes electronic circuitry and an antenna to receive and process signals from the Global Positioning System (GPS) and Global Navigation Satellite System (GNSS), hereafter referred to as GPS, for measuring radiosonde velocity and position. The radiosonde transmits these thermodynamic and position measurements via a 403MHz transmitter and antenna to the Radiosonde Tracking System (RTS) for data processing.

### 3.1 RADIOSONDE REQUIREMENTS

#### Radiosonde Design

- 3.1.1 The radiosonde shall be calibrated prior to delivery to the Government.
- 3.1.2 The radiosonde shall process telemetry data at a continuous rate of 2.0 seconds or faster.
- 3.1.3 The radiosonde battery shall provide a minimum of 135 minutes of power after radiosonde preparation.
- 3.1.4 The radiosonde design shall prevent early termination and performance degradation from moisture penetration under flight conditions.
- 3.1.5 The radiosonde sensors shall perform consistently from radiosonde-to-radiosonde and lot-to-lot. The preferred radiosondes have sensor coatings applied in a consistent and uniform manner, both sensor-to-sensor and lot-to-lot.
- 3.1.6 The radiosonde materials shall be rigid and strong enough to withstand normal handling on the ground before release and the stresses of a flight.
- 3.1.7 There shall be no sharp edges, corners, nor protrusions that could cause personal injury.
- 3.1.8 The color of the sleeve or case (if no sleeve is provided) shall be such that solar/infrared radiation effects on the sensors are minimized.
- 3.1.9 The mounting of the external sensor(s) shall prevent unintentional sensor movement which degrades sensor performance during release and flight.
- 3.1.10 All radiosondes of a specific model delivered under the contract shall be identical in all respects, including pressure, temperature, and RH sensors, transmitters, GPS receiver, associated circuitry and processing algorithms, and physical characteristics.

#### Radiosonde Packaging Requirements

- 3.1.11 The radiosonde packaging shall maintain the integrity and safety of the radiosonde throughout the life of transport and circulation throughout the inventory system, so that at its ultimate destination the radiosonde is operationally functional and undamaged. Each carton/case and outer containers shall contain a bar-coded label containing the Agency Stock Number (ASN) and National Stock Number (NSN) numbers for a radiosonde box.
- 3.1.12 Each carton/case and outer containers shall also be labeled with contract number, manufacturer’s name, date of manufacture, for example see Figure 1.

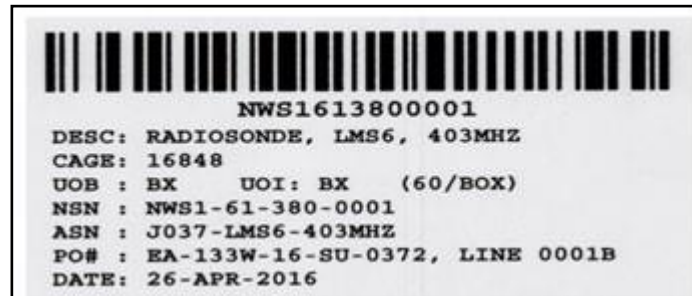


Figure 1 – Packing Label

- 3.1.13 A packing list with serial numbers and secured to the outer most container either within a clear, plastic shipping envelope or affixed, shall be provided with each shipment of radiosondes to a destination.
- 3.1.14 The entries to be shown on the packing list shall be specified by the Contracting Officer prior to the first shipment.
- 3.1.15 Sufficient desiccant shall be packed in each sealed container to prevent condensation of entrapped water vapor at low temperature.
- 3.1.16 The desiccant shall be packed in a sturdy, spill-proof package and not contaminate any part of the radiosonde.
- 3.1.17 A serial number shall be securely applied to the outside of the casing for easy viewing.
- 3.1.18 The serial number shall consist of not more than 12 characters (numerals and letters).
- 3.1.19 The preferred format of the serial number is YYJJJ-XXXXXXX, with YY - calendar year, JJJ - Julian Date (1-366), and XXXXXX - sequential ID# (000001 to 999999).
- 3.1.20 All lettering shall be permanent and impervious to liquid and moisture (i.e. weatherproof). The preferred lettering remains readable for at least 6 months when exposed to operational conditions.
- 3.1.21 The battery compartment shall be designed to prevent leakage from the battery compartment to the exterior of the radiosonde and of gases onto any of the radiosonde electronics or sensors during preparation, installation, flight, and on the ground after flight termination.

#### Lifting Device

- 3.1.22 There shall be a lifting device attached to the top of the case or sleeve over the center-of-gravity of the radiosonde when prepared for flight.
- 3.1.23 The lifting device shall be designed for convenient attachment of the balloon flight train.
- 3.1.24 Neither the lifting device nor any component of the radiosonde shall be damaged by pulling on the lifting device.

#### Radiosonde Labels

- 3.1.25 The label text and/or symbols shall be of such contrast to be easily legible in low light conditions.
- 3.1.26 The labels shall remain affixed to the radiosonde sleeve or case for at least 6 months.
- 3.1.27 The labels shall be clearly legible. The preferred labels remain legible when exposed to outdoor environmental conditions for at least six months.
- 3.1.28 The radiosonde shall have a Harmless Label as shown in Figure 2.
- 3.1.29 The Harmless Label shall be on three different sides of the radiosonde or as negotiated with the Government.



Figure 2: Harmless Weather Instrument Label

- 3.1.30 The radiosonde label(s) shall also use the largest, legible and high contrast Arial font the side will permit without impacting the radiosonde performance.
- 3.1.31 One of the sides with a Harmless Label shall also include the label shown in Figure 3.

This is a radiosonde, a balloon-borne instrument used by the NOAA National Weather Service (NWS) to obtain data aloft for weather forecasts and research. IT IS NOT DANGEROUS. Please do not return the radiosonde to the NWS. Recycle or dispose of properly.

**Figure 3: Additional Harmless Label**

- 3.1.32 The radiosonde shall have at least one NOAA Symbol Label shown in Figure 4.



**Figure 4: NOAA Symbol**

- 3.1.33 The NOAA Symbol shall have a height not less than 2.5 cm and can be monochromatic.
- 3.1.34 The NOAA symbol shall be located on the radiosonde side opposite of the temperature sensor or as negotiated with the Government.

**Mailing Bag - Only for Vendors offering radiosonde reconditioning services.**

- 3.1.35 A folded, plastic self-sealing mailbag shall be attached to each radiosonde to allow recovery and return of the instrument to the Government.
- 3.1.36 The mailbag shall have a postage-paid address, provided by the Government, printed on it.
- 3.1.37 One of the sides with a Harmless Label shall include the label shown in Figure 5.

This is a radiosonde, a balloon-borne instrument used by the NOAA National Weather Service (NWS) to obtain data aloft for weather forecasts and research. IT IS NOT DANGEROUS. Please use the enclosed mailing bag (<mailing bag location>) for return to NOAA/NWS. Postage is prepaid. Return of the instrument will allow the radiosonde to be used again.

**Figure 5 - Mailing Bag Label**

**Radiofrequency Requirements**

- 3.1.38 The radiosonde transmitting frequencies shall be in the range of 400.15 to 405.99 MHz.
- 3.1.39 The radiosonde shall be tunable to a minimum of 16 individual frequency channels.
- 3.1.40 The radiosonde antenna shall be designed to minimize personal injury during handling and when radiosonde descends after flight termination.



- 3.1.41 Radiosonde operation shall comply with National Telecommunication and Information Administration (NTIA) spectrum management policy, allocation, regulations, and technical standards as specified in Chapter 10 of the Manual of Regulations and Procedures for Federal Radio Frequency Management (Redbook).

#### General Measurement Requirements

- 3.1.42 The requirements specified herein are applicable to all measurements.
- 3.1.43 Atmospheric measurements shall meet all measurement error requirements and be reported when the radiosonde is exposed to all real-world combinations of environmental conditions.
- 3.1.44 The radiosonde shall have no more than 3 % data loss over the duration of the flight.
- 3.1.45 The radiosonde shall meet the atmospheric thermodynamic measurement requirements with a ventilation rate of 4-6 m/s from surface to termination.
- 3.1.46 No more than 1% of a sounding shall have a temperature cooling lapse rate exceeding -1.5 °C per 50 m to minimize perturbations to air temperature measurements from wetting, icing and condensation.

#### Pressure Measurement Requirements

- 3.1.47 The required pressure measurement error is 1.8 hPa, from surface to 100 hPa.
- 3.1.48 The required pressure measurement error is 0.6 hPa, from 100 hPa to 10 hPa.

#### Pressure Functional Precision Requirements

- 3.1.49 No more than 5 % of all pressure measurements during a time paired flight shall exceed an accuracy of 1.8 hPa at pressure > 400 hPa and 0.6 hPa at pressure from 400 – 4 hPa.
- 3.1.50 No more than 1 % of all pressure measurements during a time paired flight shall exceed an accuracy of 3.6 hPa at pressure > 400 hPa and 1.2 hPa at pressure from 400 – 4 hPa.

#### Temperature Measurement Requirements

- 3.1.51 The required radiosonde temperature measurement error is 0.5 °C from surface to 100 hPa.
- 3.1.52 The required radiosonde temperature measurement error is 1.0 °C from 100 to 10 hPa.

#### Temperature Functional Precision Requirements

- 3.1.53 No more than 5 % of all temperature measurements during a flight shall exceed an accuracy of 0.4 °C at temperatures from -95.0 °C to +50.0 °C.
- 3.1.54 No more than 1% of all temperature measurements during a flight shall exceed an accuracy of 0.8°C at temperatures from -95.0 °C to +50.0 °C.

#### Relative Humidity Measurement Requirements

- 3.1.54.1 The required radiosonde humidity measurement error is 5 percent in the troposphere. The preferred relative humidity sensor performance is not degraded as a result of moisture or frost buildup on or near the surface of the humidity sensor.
- 3.1.55 Mechanical hygrometers and carbon hygistor sensors shall not be utilized.

#### Relative Humidity Functional Precision Requirements

- 3.1.56 No more than 5 % of all relative humidity measurements during a flight shall exceed an accuracy of 5 % at temperatures from +50 °C to -60 °C.
- 3.1.57 No more than 1 % of all relative humidity measurements during a flight shall exceed an accuracy of 10 % at temperatures from +50 °C to -60 °C.

#### Wind Measurement Requirements

- 3.1.58 The radiosonde and radiosonde tracking system shall use data provided by the GPS to calculate the atmospheric wind measurement. The preferred radiosonde acquires GPS satellite lock prior to launch and retains GPS throughout flight.

#### Wind Direction Measurement Requirements

- 3.1.59 The radiosonde wind direction error shall not exceed 5.0° from surface to 100 hPa and < 15 m/s.
- 3.1.60 The radiosonde wind direction error shall not exceed 2.5° from surface to 100 hPa and > 15 m/s.
- 3.1.61 The radiosonde wind direction error shall not exceed 5.0° from surface to 100 to 10 hPa.

#### Wind Speed Measurement Requirements

- 3.1.62 The radiosonde wind speed error shall not exceed 1 m/s from surface to 100 hPa.
- 3.1.63 The radiosonde wind speed error shall not exceed 2 m/s from 100 to 10 hPa.

#### U and V Wind Components Functional Precision

- 3.1.64 No more than 5 % of all u and v wind component measurements during a time paired flight shall exceed an accuracy of 1.0 m/s.
- 3.1.65 No more than 1 % of all u and v wind component measurements during a time paired flight shall exceed an accuracy of 2.0 m/s.

#### Position Measurement Requirements

- 3.1.66 The radiosonde shall determine and report the instantaneous radiosonde GPS position and altitude.
- 3.1.67 The radiosonde altitude reference datum shall be Mean Sea Level (MSL).
- 3.1.68 The horizontal and vertical position measurement ranges shall be reported in latitude, longitude, and altitude to a minimum of 250 km slant range and 38 km altitude from the launch site.
- 3.1.69 The maximum horizontal position error shall not exceed 5.0 meters Circular Error Probability (CEP) 90 and the maximum vertical position error shall not exceed 20.0 meters CEP 90 of the received data during radiosonde flight, in the absence of radio frequency (RF) multipath environment and with at least 5 matching satellites in use.

#### Radiosonde Performance Requirements

- 3.1.70 The time for the radiosonde to download GPS ephemeris data and acquire minimum satellite lock shall not require more than 5.0 minutes during preparation.
- 3.1.71 The radiosonde shall have no more than 3 % data loss over the duration of the flight.
- 3.1.72 The radiosonde shall not lose more than 5 % of pressure, temperature, humidity, radiosonde velocity, radiosonde position, and wind velocity data per 5 minutes of flight time during the duration of the flight.
- 3.1.73 Radiosonde preparation shall not degrade radiosonde performance.
- 3.1.74 Preparation of the radiosonde shall not exceed 15 minutes.

#### Radiosonde Documentation

- 3.1.75 The radiosonde documentation shall provide storage, preparation and operation instructions.

#### Radiosonde Configuration Management

- 3.1.76 The radiosonde provided is compatible with the current NWS fielded tracking system or software.
- 3.1.77 The radiosonde provided does not degrade the performance of the current NWS fielded tracking system or software.
- 3.1.78 Any planned changes made to any part of the radiosonde shall be documented and be provided to the Contracting Officer a minimum of 90 days before delivery to the government.