Official Site Metadata Information
Caribou, Maine

Surface Observing Instrumentation (RSOIS)
Radiosonde Replacement System (RRS)
MicroART

-EXAMPLE-

Prepared by
Sterling Field Support Center

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service/Office of Operational Systems
Field Systems Operations Center/Observing Systems Branch

Introduction

Information obtained for this metadata record was surveyed and recorded by the Sterling Field Support Center using the Trimble GPS Receiver Model 5700. Data was collected at all survey points for a period of 4 hours and was received in a "Static" form at each location. Within this document, it can be seen that pictures documenting each cardinal direction for the respective survey point are included, with additional photos included to allow for perspective of any surrounding obstacles. Reasoning for these locations will be described below as necessary.

While surveying the Radiosonde Surface Observing Instrumentation System (RSOIS), the Trimble GPS Zephyr Antenna was positioned directly under the temperature/humidity unit. An estimated position error of less than .03 meters was recorded for this survey. In order to obtain proper perspective, a distance of approximately 48 feet was measured to the South East of the RSOIS tower base. This point provides a clear view of potential obstacles, including a storage shed to the north of the RSOIS tower, the Weather Forecast Office to the North West, and an inflation building housing the MicroART to the West. The lot where the RSOIS tower is located is surrounded by a metal fence extending from the ground. Located on the North side of the fence is an asphalt parking lot and on the East side a two lane road.

In order to create the metadata file for the Radiosonde Replacement System, the Trimble GPS Zephyr Antenna was positioned on the end of the NAGS antenna for the survey. An estimated position error of less than .03 meters was recorded. While the formal release point for RRS is considered to be located directly below the elevated TRS dish, the actual release location was considered to be 30 feet from this point through the South-facing inflation bay door. This location and an area encompassed by a 25 foot radius in all directions should be noted as the area where the balloon is released under ideal conditions. If a balloon is being launched under non-ideal conditions, a distance greater than 25 feet may be needed to launch. In order to properly document the site in relation to surrounding obstacles, all photos for the RRS survey were taken at a location approximately 65 feet to the South West from the actual release location previously mentioned.

The final survey completed was for the MicroART system where the Trimble GPS Zephyr Antenna was placed on the mounting plate in order to remain stable. The antenna and the mounting plate were then positioned atop the MicroART Elevation Housing Assembly to conduct the survey. An estimated position error of less than .10 meters was recorded. Because the ART is not a ground based system at this office, photos were taken at the base of the building which supports the elevated MicroART dome. This location sits along the edge of the previously mentioned asphalt parking lot. On the east side of the building sits the grassy lot where the RSOIS tower is located and on the western side the balloon release area.

Figure 1. NWS WFO Caribou, ME image illustrating respective locations of existing Upper Air Facility, Inflation Bay, Release Area, MicroART Dome, and Surface Observing Instrumentation.

SITE SPECIFIC DATA FOR: Weather Forecast Office Caribou, ME
Date(s) Recorded: November 29-30, 2011
Survey Team: B. Fling, R. Brown, K. Webster, J. Fitzgibbon

Resident Site Specific Data: Caribou, ME Weather Forecast Office – RSOIS Site Position information was determined using a Trimble GPS receiver model 5700. Estimated position error less than .03 meters.

Site Commentary

This automated surface observing system, the Radiosonde Surface Observing Instrumentation System (RSOIS), reports surface data parameters for radiosonde deployments and observations. This system consists of a remote processing unit (RPU), an ultrasonic wind sensor, a temperature and humidity unit, communication equipment, and a lightning/ground electrode system.

The RPU receives, processes, logs and transmits data from various sensors. It is housed within a stainless steel National Electrical Manufacturing Association (NEMA)-4 enclosure and contains a Zeno® 3200 system data logger (SDL), a power distribution module, a 12-volt (V) battery, communication equipment, sensor connector inputs and, if required, a heater. The RPU is lightning and transient energy protected using a lightning protection kit, a ground electrode kit, and circuit board level capacitors and diodes.

The temperature/humidity unit consists of a combined ambient temperature (AT) and relative humidity (RH) sensor housed in an R.M. Young 43408F-12 Gill Motor Aspirated Radiation Shield Assembly that reduces radiation errors to less than 0.1°C. The sensor is comprised of a Vaisala HMP45D temperature/humidity probe equipped with a Humicap 180 capacitive thin film polymer humidity sensor and modified with the replacement of the Pt 100 IEC 751 1/3 Class B temperature sensor with the YSI 44034 thermistor temperature sensor. The thermistor resistance and capacitive thin film polymer voltage are sampled once per second on a 18-bit analog-to-digital converter (ADC) channel. A glass encapsulated magnetic reed switch activated by an air flow monitor is located in the blower motor housing and provides fan-fail detection. The time constant to affect a 5°C change in AT and calculated dew point (DP) is 5 minutes while aspirated. The radiation shield has a sealed terminal box for easy servicing.

Wind speed and direction are sampled by the Vaisala/Hander 425AHW Ultrasonic Wind Sensor. The wind sensor comes equipped with thermostatically controlled heaters in the transducer heads to prevent freezing rain or snow buildup. The sensor is polled every second by the SDL and returns a 5-second vector average wind speed, vector average wind direction, heater circuit quality and other data using the Serial Digital Interface (SDI-12) protocol (an industry communication standards for interfacing microprocessor-based sensors with SDLs) at 1200 baud.

Coastal Environmental Systems' Precision Digital Barometer PDB-1 senses and continuously indicates real-time raw (sensor) barometric pressure and real-time altimeter setting with accuracy and precision. Calculated values that can be obtained include field pressure, station pressure, sea-level pressure, density altitude, and pressure altitude. All calculated values are based on temperature and elevation settings. The sensor pressure and diagnostics are logged at a rate selectable between once per 10 seconds and once per day. The PDB-1 is comprised of an integrated Precision Digital Barometer assembly (Barometer Box), a 10 foot communications cable with DE-9 connectors at either end for connecting the PDB to a PC, an external air temperature sensor with a 20 foot cable, and a power cable.

Sterling Field Support Center
Upper Air Related Equipment
Surface Observation Instrumentation

Station Name	WFO Caribou, ME
Station Latitude (dd:mm:ss.sssss)	Additional survey equip. needed
Station Longitude (ddd:mm:ss.sssss)	Additional survey equip. needed
Station Elevation (MSL)	Additional survey equip. needed
WMO No	72712
WMO Region	4
Station ID	KCAR
Time Zone	UTC-5
Surface Observation Equipment Type	RSOIS
Distance from Release Point (m)	77.3 m
Surface Observation Equipment Elevation (msl)	189.625 m
Surface Observation Equipment Bearing (Deg)	98.09° from Upper Air facility
Temperature Sensor	
Elevation (AGL)	2.3114 m
Orientation (Bearing)	9°
Manufacturer	Vaisala
Model	YSI 44034
Type	Thermistor
Calibration Date	September 2011
Relative Humidity Sensor	
Elevation (AGL)	2.3114 m
Orientation (Bearing)	9°
Manufacturer	Vaisala
Model	Humicap 180
Type	Capacitive Thin Film
Calibration Date	September 2011
Wind Sensor	
Elevation (AGL)	31 m
Orientation (Bearing)	9°
Manufacturer	Vaisala/Handar
Model	425AHW
Type	Ultrasonic Wind Sensor
Calibration Date	September 2011
Barometer	
Elevation (MSL)	Additional survey equip. needed
Elevation (AGL)	Additional survey equip. needed
Orientation (Bearing)	Additional survey equip. needed
Manufacturer	Coastal Environmental Systems
Model	PDB-1
Type	Precision Digital Barometer
Calibration Date	March 10, 2011

Figure 2. RSOIS Tower and surrounding obstacles viewed from approximately 48 feet looking Northwest

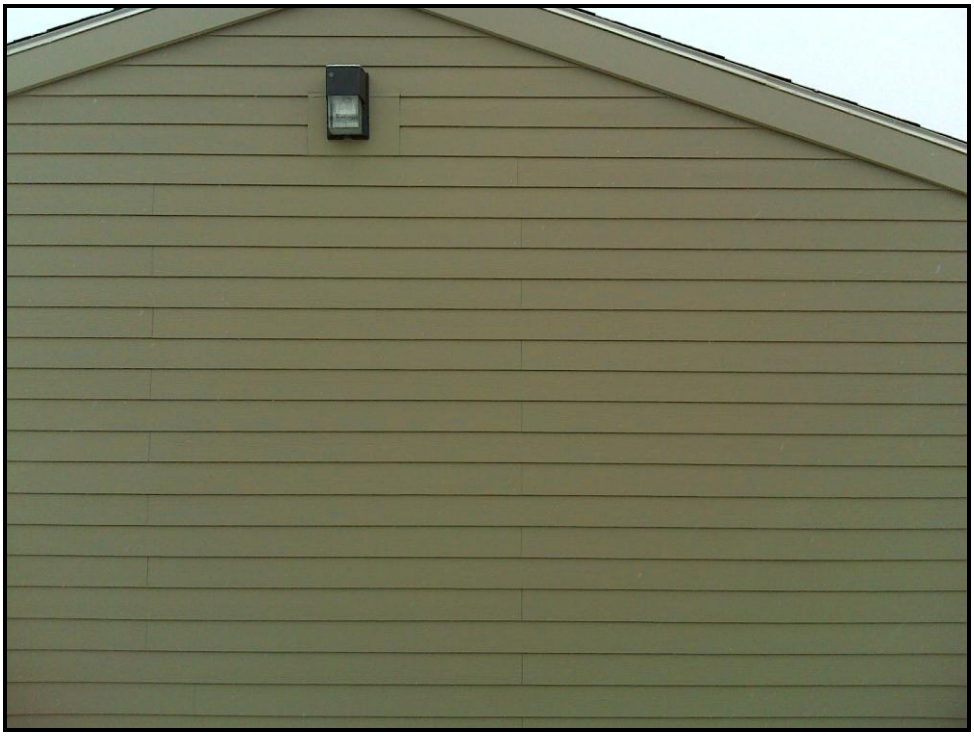

Figure 3. Looking North from base of RSOIS Tower

Figure 4. Looking East from base of RSOIS Tower

Figure 5. Looking South from base of RSOIS Tower

Figure 6. Looking West from base of RSOIS Tower

SITE SPECIFIC DATA FOR: Weather Forecast Office Caribou, ME
Date(s) Recorded: December 2, 2011
Survey Team: B. Fling, R. Brown, K. Webster, J. Fitzgibbon

Resident Site Specific Data: Caribou, ME Weather Forecast Office – RRS
Position information was determined using a Trimble GPS receiver model 5700.
Estimated position error less than .03 meters.

Site Commentary

The TRS continuously tracks the radiosonde as it is carried into the upper atmosphere by a sounding balloon until termination of the flight. The TRS receives this meteorological data as it is transmitted over a 1680 MHz band from the radiosonde at a nominal 1 Hz rate and sends the received data to the SPS via a 10.7 MHz signal. The SPS performs the required decoding of the received signal to recover the meteorological and GPS data measured by the sensors in the radiosonde. Together with GPS data from a local receiver, the SPS uses this data to compute atmospheric pressure, temperature, humidity and wind at the radiosonde position once every second while it is carried up through the atmosphere. The TRS operates with any radiosonde/SPS combination that meet the SPS interface and data requirements.

The TRS is an integrated electromechanical device that uses microprocessors and software and works on the principle of an automatic radiotheodolite. A 2-meter parabolic dish antenna is mounted on a movable frame to allow for both azimuth and elevation tracking movements. By measuring and adjusting for azimuth and elevation errors relative to boresight, the antenna is able to track a moving radiosonde to a great distance. Servomotors under the control of the TRS Motion Control Unit (MCU) accomplish these movements.

Within the TRS 19-inch rack are electronic components that provide power to the antenna, manage communications within the TRS, process the telemetry received by the antenna and transmit data to the SPS and RRS Workstation. There are also components which provide control of the environment within the 19-inch rack. Antenna functions can be controlled by the RRS Workstation or by the Control Display Unit (CDU) included with the system.

This IMS-2000 Telemetry Receiver System (TRS) was provided by InterMet Systems.

Station Name	WFO Caribou, ME
Station Latitude (dd:mm:ss.sssss)	Additional survey equip. needed
Station Longitude (ddd:mm:ss.sssss)	Additional survey equip. needed
Station Elevation (MSL)	Additional survey equip. needed
WMO No	72712
WMO Region	4
Station ID	KCAR
Time Zone	UTC-5
WBAN	14607
WSFO ID	PWM
AWIPS XXX (FAA) ID	CAR
Base Pressure (hPa)	850
Release Point Latitude (dd:mm:ss.sssss)	46°52’5.53267”
Release Point Longitude (ddd:mm:ss.sssss)	-68°0’48.71420”

Release Point Elevation (MSL)	191.1614
Release Point Pressure Correction (hPa)	Additional survey equip. needed
Basestation GPS Elevation (WGS84)	178.238
Basestation GPS Elevation (MSL)	201.609
Basestation GPS Latitude (N+/S- ddmmss.fffff)	46°52’5.53267”
Basestation GPS Longitude (E+/W- dddmmss.fffff)	-68°0’48.71420”
TRS Elevation (m)	198.884
TRS Latitude (N+/S- ddmmss.s)	46°52’5.53267”
TRS Longitude (E+/W- dddmmss.s)	-68°0’48.71420”
Orientation Correction Azimuth Angle (Deg)	0.00°
Orientation Correction Elevation Angle (Deg)	0.00°
Surface Observation Equipment Type	RSOIS
Distance from Release Point (m)	77.3 m
Surface Observation Equipment Elevation (MSL)	189.625 m
Surface Observation Equipment Bearing (Deg)	98.09° from Upper Air facility
Radiosonde Type	Vaisala RS92-NGP GPS
Ground Receiving System	TRS IMS-2000
Ground Receiving System Serial Number	0009
Radiosonde Tracking Method	GPS
Barometer Height (MSL)	Additional survey equip. needed
Balloon Shelter Type	Low Bay
Balloon Gas	Helium
Operating Frequencies (MHz)	1680
Rooftop Release	N/A
WMO Header (FZL)	UXUS97
WMO Header (MAN)	USUS97
WMO Header (SGL)	UMUS97
WMO Header (ABV)	UFUS97
WMO Header (ULG)	NXUS97
WMO Header (DD1)	IUDD01
WMO Header (DD2)	IUDD02
RRS Application Offline Maintenance Site Specific Data	
RRS Station ID (Kxxx)	KCAR
TRS Position Latitude (ddmmss.x)	46°52’5.53267”
TRS Position Longitude (dddmmss.x)	-68°0’48.71420”
TRS Elevation (m)	198.884
TRS Bearing to Baseline area - AZ	Additional survey equip. needed
TRS Bearing to Baseline area - El	Additional survey equip. needed
TRS Bearing to Release area - AZ	180
TRS Bearing to Release area - El	-5
RWS Site Specific Data	
RWS IP Address	205.156.27.10
RWS Computer Name	CAR-W-RWS
Default Gateway	205.156.27.4

Subnet Mask	255.255.255.0
Preferred DNS Server	205.156.27.242
Alternate DNS Server	198.206.58.242
Primary AWIPS Data Type	LAN
Primary AWIPS Data Phone No.	N/A
Primary AWIPS Data Server IP	205.156.27.60
Primary AWIPS User Name	RRS
Back Up 1 AWIPS Data Type	Phone 1
Back Up 1 AWIPS Data Phone No.	
Back Up 1 AWIPS Data Server IP	
Back Up 1 AWIPS User Name	
Back Up 2 AWIPS Data Type	Phone 2
Back Up 2 AWIPS Data Phone No.	631-589-7236
Back Up 2 AWIPS Data Server IP	198.206.32.180
Back Up 2 AWIPS User Name	RRS
Back Up 3 AWIPS Data Type	Phone 3
Back Up 3 AWIPS Data Phone No.	817-978-0045
Back Up 3 AWIPS Data Server IP	206.165.6.150
Back Up 3 AWIPS User Name	RRS
GPS Repeater Site Specific Data	
GPS Repeater Amplifier Gain Setting	30
TRS Adjustable Coefficients	
cc@0	20020419
cc@1	20011109
ccv	24
cci	01
cm@0	20020419
cm@1	20020206
cmv	24
aai	00
aei	00
cs@0	20020723
cr@0	20020402
cr@1	20020402
cr@2	20020402
cr@3	20020402
crv	24
cris	0982
crqs	+0157
crqo	-128
crcd	+0004
crc0	0535
crqd	+025
crqc	-068

crqr	20
crd	094
cro	B
crlo1	+050
crlo2	+090
crlo3	+040
cl@0	20011126
cl@1	20020220
clbv	15
clbf	4440
clv	24
cl1	024
c2@0	20011124
c2@1	20020220
c2bv	15
c2bf	4390
c2v	23
c2l	000
TRS Site Specific Coefficients	
ccsf	168500012
ccsq	-0802A
ccsa	1234002B
ccse	032500
cma	Use survey data and proper format
cmu	Use survey data and proper format
cmn	Use survey data and proper format
cmoa	+00000016
cmoe	+0008271F
cmia	15429030
TRS Special Coefficients for Scanner/LNA Modifications	
crqw	+3604
crql	+221A

Figure 7. Looking North from approximately 65 feet to the SW from designed release area

Figure 8. Looking East from approximately 65 feet to the SW from designed release area

Figure 9. Looking South from approximately 65 feet to the SW from designed release area

Figure 10. Looking West from approximately 65 feet to the SW from designed release area

SITE SPECIFIC DATA FOR: Weather Forecast Office Caribou, ME
Date(s) Recorded: December 5, 2011
Survey Team: B. Fling, R. Brown, K. Webster, J. Fitzgibbon

Resident Site Specific Data: Caribou, ME Weather Forecast Office –MicroART
Position information was determined using a Trimble GPS receiver model 5700.
Estimated position error less than .10 meters.

Site Commentary

The Automatic Radiosonde Theodolite (ART) is an elevated Radio Direction Finding (RDF) system that automatically tracks the radiosonde with a minimum power of 200 milliwats. The ART is the Ground Meteorological Device pedestal (GMD-1940s, now the ART1) and the Weather Bureau Radio Theodolite pedestal (WBRT, now the ART2) that were updated with new electronics in the mid-80s and a new processor, the MicroART and IBM-XT, in 1990. A single dipole antenna with conical lobe scanning yields a main lobe pattern in both E and H planes. It tracks the radiosonde using synchro-transmitters to resolve angles, which are used by the IBM-XT to calculate wind speed and direction. The tracked radiosonde transmits signals in the form of amplitude or frequency modulation that is received, detected, processed, amplified and recorded by the ART system. This information is then converted into useful values such as temperature, relative humidity and pressure.

The ARTIC board interfaces the IBM-XT with the ART and receives Angle and pressure, temperature, and humidity data. The ARTIC board is designed to go in Expansion Slot 1 and can only operate on the IBM-XT 8 MHz bus. The IBM-XT is used to process, encode and disseminate the data.

Because the ART is a Radio Direction Finding, a test target is used to check the accuracy of the system prior to each flight. The operators may also enter the limiting angle information in the MicroART program where the Limited Angle Zone is 6 degrees above the horizon and 6 degrees each side and above any hard objects and just clears above and around any trees on the horizon. The MicroART does not use any wind data from within the Limited Angle Zone.

Station Name	WFO Caribou, ME
Station Latitude (dd:mm:ss.sssss)	Additional survey equip. needed
Station Longitude (ddd:mm:ss.sssss)	Additional survey equip. needed
Station Elevation (msl)	Additional survey equip. needed
WMO No	72712
WMO Region	4
Station ID	KCAR
Time Zone	UTC-5
WBAN	14607
Base Pressure (hPa)	850
Release Point Latitude (dd:mm:ss.sssss)	46°52’5.53267”
Release Point Longitude (ddd:mm:ss.sssss)	-68°0’48.71420”
Release Point Elevation (msl)	191.1614
Release Point Pressure Correction (hPa)	0.00
Target Antenna Azimuth Angle (deg)	183.70°
Target Antenna Elevation Angle (deg)	3.00°

Sterling Field Support Center
Upper Air Related Equipment
MicroART

MicroART Elevation (m)	197.368
MicroART Latitude (N+/S- ddmmss.s)	46°52’5.04442”
MicroART Longitude (E+/W- dddmmss.s)	-68°0’46.55240”
Orientation Correction Azimuth Angle (Deg)	0.00°
Orientation Correction Elevation Angle (Deg)	0.00°
Surface Observation Equipment Type	RSOIS
Distance from Release Point (m)	77.3 m
Surface Observation Equipment Elevation (MSL)	189.625 m
Surface Observation Equipment Bearing (Deg)	98.09° from Upper Air facility
Radiosonde Type	Lockheed Martin Sippican B2
Ground Receiving System	MicroART-2R
Radiosonde Tracking Method	RDF
Barometer Height (MSL)	Additional survey equip. needed
Balloon Shelter Type	Low Bay
Balloon Gas	Helium
Operating Frequencies (MHz)	1680
Rooftop Release	N/A
WMO Header (FZL)	UXUS97
WMO Header (MAN)	USUS97
WMO Header (SGL)	UMUS97
WMO Header (ABV)	UFUS97
WMO Header (ULG)	NXUS97
WMO Header (DD1)	IUDD01
WMO Header (DD2)	IUDD02
Host Computer	AFOS

Figure 11. Looking North from base of elevated MicroART system

Figure 12. Looking East from base of elevated MicroART system

Figure 13. Looking South from base of elevated MicroART system

Figure 14. Looking West from base of elevated MicroART system