OPERATION OF PORTABLE SATELLITE UNIT

CONTENTS

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1.0 SCOPE AND APPLICATION

This standard operating procedure (SOP) describes the setup and operation of the Winegard Engineering DT740 Portable Satellite Unit. The procedures and figures contained in this SOP are taken from the *EPA National Approach to Response Field Communications (NARFCOM) Portable Satellite Units (PSU) Quick Start Guide* (2008). Some material is excerpted without change from this manual. This SOP will be used for educational and training purposes only.

The Portable Satellite Unit (PSU) provides on-scene long range communications critical in emergency and disaster situations. Communications connect and help move logistical, rescue, and first responder resources in any region of the world facing or recovering from natural or man-made disasters. Deploying wireless communications is typically among the first priorities in any emergency response, rescue, or relief situation. However, terrestrial wireless equipment, such as cellular phones or land mobile radios, is only useful when communications towers and other fixed equipment are in place to connect wireless equipment to the local and global communications network. In the majority of emergency situations, this infrastructure has either been destroyed by the disaster or was never available at the site. The PSU is readily located to any region of the world and in conjunction with satellites provides a wireless communications infrastructure that is not susceptible to damage from disasters.

A Quality Assurance Project Plan (QAPP) in Uniform Federal Policy (UFP) format describing the project objectives must be prepared prior to deploying for a sampling event. The sampler needs to ensure that the methods used are adequate to satisfy the data quality objectives (DQOs) listed in the QAPP for a particular site.

The procedures in this SOP may be varied or changed as required, dependent on site conditions, equipment limitations or other procedural limitations. In all instances, the procedures employed must be documented on a Field Change Form and attached to the QAPP. These changes must be documented in the final deliverable.

2.0 METHOD SUMMARY

The Portable Satellite System is modularly designed. The DT740 system utilizes a 0.96 meter antenna and an I-Direct 3100 satellite modem. The basic antenna pointing mechanism skews the entire antenna rather than only the horn assembly.

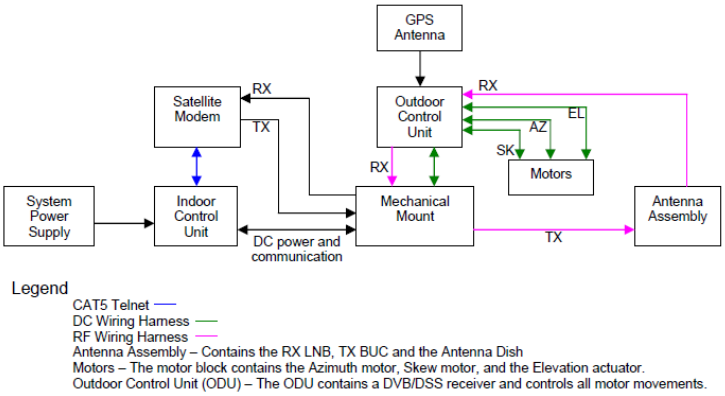
The antenna system utilizes an internet modem and 110/220 volt alternating current (AC) power source to operate. The modem is connected to the Indoor Control Unit (IDU) through a CAT5 telnet cable and to the antenna system through two (2) RG6 coaxial cables. These cables are terminated with environmentally sealed F connectors. The modem supplies the direct current (DC) voltage necessary for the Low Noise Block (LNB). The IDU supplies 48 volts DC to the antenna system through an RG6 cable. Communications between the IDU and the antennas Outdoor Control Unit (ODU) are carried over the antenna's power cable utilizing Bluetooth Protocol. This cable is terminated with BNC connectors.

The modular design is used to make assembly and repair as efficient as possible (see the Functional Block Diagram below). The system utilizes an onboard global positioning system (GPS) receiver to determine pointing elevation and correct skew angle. The pointing angle is also compensated by pitch and roll detectors. An onboard compass is used to automatically determine the correct pointing direction. An antenna heading can also be entered into the system to by-pass the compass fixed heading mode.

The antenna uses an onboard Digital Video Broadcast (DVB) receiver to find the correct satellite. The system then fine tunes the pointing position. The method for fine tuning uses information from the modem to adjust the azimuth, elevation, and skew for optimal signal integrity.

There are several safety features built into the antenna system. These features automatically stow the antenna if certain criteria are met. These include loss of receive signal lock, detected motion of pitch, roll, and velocity.

Functional Block Diagram



3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

This section is not applicable to this SOP.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

- Satellite communications are affected by moisture and various forms of precipitation in the signal path due to scattering and absorption.
- A clear line of sight between the dish and the satellite is required for the system to operate.
- Signal is impacted by the presence of trees and other vegetation in the signal path.
- Reflections from objects near the signal path can decrease signal power.
- Electromagnetic interference from nearby power sources may cause signal degradation.
- High winds may cause antenna dish to wobble and lose alignment.

5.0 EQUIPMENT/APPARATUS

The following equipment is provided for the operation of the Portable Satellite Unit:

- I-Autosat 96 0.96 meter satellite dish on a portable mounting platform
- I-Direct 3100 Modem
- 3-Watt Transmitter
- Touch Screen Controller
- RX, TX and Electrical Interface Cables
- Power Strip
- Connections
- Wireless Network Broadband Router w/ SRX Extended Range
- PSU-CU
- Extension Power Cord
- Shipping Container

6.0 REAGENTS

This section is not applicable to this SOP.

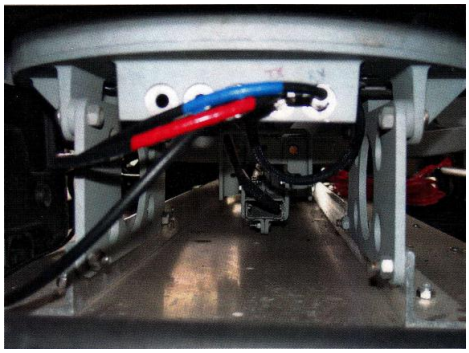
7.0 PROCEDURES

7.1 Setup

1. Place the rack mounted PSU in a secure area located away from pedestrian traffic.
2. Use a portable barricade system, such as caution tape, temporary fencing, or traffic cones, to restrict the area roughly 2 meters around the PSU.
3. Make sure that there is an unobstructed view of the southern sky.

   NOTE: The PSU-CU is NOT weatherproof and should always be kept out of the weather at all times.

4. Locate the three (3) cables that are connected to the modem of the PSU as shown below.



5. Ensure that the cables are in good condition and run to the PSU-CU in a safe manner.
6. If running the cable across a road, ensure that the cable is properly buried or shielded.
7. Connect the 3 cables to the PSU-CU, as shown below.

8. Connect the control cable to the cam connection on the back of the modem in the PSU-CU.
9. Connect the RX cable from the rack mounted portion of the PSU to the RX in on the back of the modem in the PSU-CU.
10. Connect the TX cable from the rack mounted portion of the PSU to the TX in on the back of the modem in the PSU-CU.

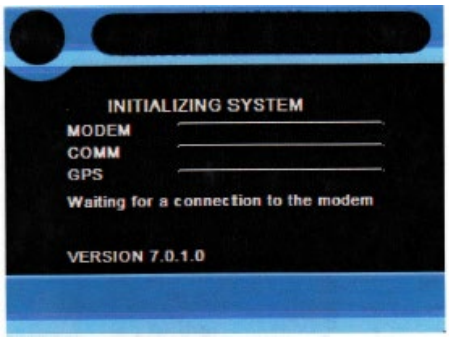
NOTE: A suggestion is to color code the RX out and TX out on the rack mounted portion of the PSU (RX red and TX blue), then mark the RX in and TX in on the back of the modem in the PSU-CU (RX red and TX blue).

11. Connect a 110 VAC power supply to the extension cord supplied with the PSU.

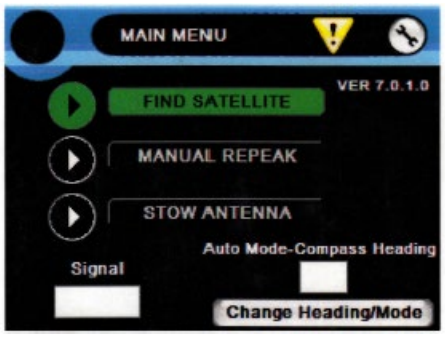
7.2 Deployment

1. Slide the touch screen out from the modem and push the green power button.

2. The screen will show that the PSU-CU is initializing taking approximately 1-3 minutes.



3. Wait for the modem to establish a connection with the satellite dish and push the GREEN Find Satellite tab.

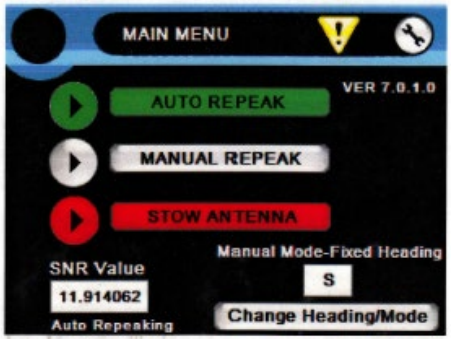


4. Wait for the PSU to automatically find and fix on the Earth Orbiting Satellite (EOS) and establish a wireless internet signal.
5. Wait through the series of screens showing the progress towards finding the EOS as presented below.

6. After establishing contact with the EOS, the PSU-CU will display the Main Menu.
7. If a connection is not optimal, there may be an obstruction, such as trees, metal fence, building, or large vehicle, blocking the clear view of the southern sky.
8. Connect the laptop computer to the satellite modem using the blue data cable.
9. Connect the laptop power supply cable.
10. Turn on the laptop and access the internet through installed browser.

7.3 Shut Down

1. From the Main Menu push the Stow Antenna tab (RED) on the touch screen as shown below.



2. Wait for the PSU to break the connection with the EOS and stow the rack mounted portion of the PSU.

3. If the dish is properly stowed, the dish icon with an arrow pointing down to represent the stowed position is displayed.
4. After the dish is stowed push the green modem power button to shut off.
5. Push the touch screen into the modem for storage.
6. Remove the data, RX, TX and power supply cables from the PSU-CU and carefully place the cables on the rack mounted portion of the PSU.
7. Turn off the main power switch.
8. Replace all transport and storage panels.

8.0 CALCULATIONS

The DT740 Portable Satellite Unit is a communications instrument requiring no calculations.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

The instrument must be operated according to the operating instructions supplied by the manufacturer, unless otherwise specified in the QAPP.

Records must be maintained, documenting the training of the operators that use instrumentation and equipment for the collection of environmental information.

10.0 DATA VALIDATION

Data verification/completeness checks must be conducted to ensure project-specific quality objectives have been met as defined in the corresponding UFP-QAPP. The U.S EPA Environmental Response Team (ERT)

contractor's Task Leader is responsible for completing the UFP-QAPP verification checklist for each project.

11.0 HEALTH AND SAFETY

Based on Occupational Safety and Health Administration (OSHA) requirements, a site-specific health and safety plan (HASP) must be prepared for response operations under the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, 29 CFR 1910.120. Field personnel working for EPA's ERT should consult the Emergency Responder Health and Safety Manual currently located at https://response.epa.gov/_HealthSafetyManual/manual-index.htm for the development of the HASP, required personal protective equipment (PPE) and respiratory protection.

12.0 REFERENCES

Winegard Engineering, 2007.2-*Way Antenna Service Manual*.

EPA NARFCOM, 2008. *EPA National Approach to Response Field Communications (NARFCOM) Portable Satellite Units (PSU) Quick Start Guide.*

13.0 APPENDIX

A - Specifications

APPENDIX A
Specifications
SOP: ERT-PROC-2208-21
March 2021

(Source: Winegard Engineering, 2007. 2-*Way Antenna Service Manual)*

GENERAL INFORMATION

Max Deployed Height: 74"
Stowed Dimensions: 12.5"H x 77.0"L
Mount Rail Width: 13"
Reflector Type: .96m Andrew Type 123
BUC Supported: NGRC 3 W or NGRC 4 W
Polarization: Cross-Pole
Weight: 160Ibs.

Mount Rotation:
Azimuth: 375 degrees
Elevation: 90 degrees to horizon
Skew (Polarization): +1- 90 degrees offset option

Environmental Survival:
Wind Deployed: 100mph
Wind Stowed: 150mph
Temperature: -58 degrees F to 176 degrees F (-50 degrees C to +50 degrees C)
Operational:
Wind: 45mph
Temperature: -40 degrees F to 122 degrees F (-40 degrees C to +80 degrees C)

Deployment Sensors:
Global Positioning Satellite (GPS): Yes
Compass: +/- 10 degrees
Tilt Sensors: +/- .5 degrees

Connections and Cabling:
Transmit (TX): RG6
Receive (RX): RG6
Electrical Data Interface: RG6 Max 50' (38.5m)

Power Requirements:
AC Input: 100-250V 3A Max 47-63Hz
DC Output: 48V 2.5A Max

Acquisition Speeds:
Deploying Elevation: 17.3 degrees per second
Stowing Elevation: 20 degrees per second
Deploying Azimuth: 7.5 degrees per second
Peaking (Cross-Pole): Average overall acquisition time 2-4 min.