Remote Measurements & Research Company
214 Euclid Av.
Seattle WA 98122
michael@rmrco.com

ROSR Procedure: Standard Installation

The Remote Ocean Surface Radiometer (ROSR) provides NIST-traceable sea-surface skin temperature (SSST) measurements in support of air-sea interaction studies or satellite calibration and validation activities. Its operational goals are to make observations autonomously from a ship at sea for six-months and with an accuracy of $\pm 0.1°$C. Intercomparison studies show much better performance; typically ± 0.04 °C.

This report describes the steps in a standard ROSR installation.

Figure 1: *Experiment setup. The ROSR is mounted high on the ship (bridge roof) and, preferably on the port side. While underway, make visual confirmation that the view (9°) well outside the ship wake.*

UNPACK

The system ships in three cases and, possibly, a set of tools.

Case 1	ROSR in Pelican Case model iM2950, yellow. Weight=35 Kg. LWH=795 × 518 × 310 mm.
Case 2	DAQ, sensors, and cables in Pelican Case model iM2950, yellow. Weight=26 Kg. LWH=795 × 518 × 310 mm.
Case 3	Frame in a heavy duty snowboard bag. Weight=15 Kg. 1730 × 240 dia mm.

- In a dry open area, unpack all items and review for damage. Follow the steps below

- Open box #1 and remove the ROSR. Check for external damage.

- Open box #2 and survey all components for damage. (DAQ electronic box, ethernet cable, rain sensor, GPS, power/coms cable, 9/16" hex wrench, laptop PC, PC power module)

- Remove the laptop and power module and turn on. Linux OS will boot up.

- Remove the electronic box. Open it and remove foam padding. Look for damage. Sometimes the DIN components come loose.

- IF rough shipping is suspected you might take a peak inside the ROSR: Use the 9/16" hex key to carefully remove the long cylinder by unscrewing the center bolt. At some point the cylinder can slide out enough to inspect the plugs on the circuit boards. Make sure all plugs are seated properly. Look for other signs of damage.
  Example: in one extreme case the plug on the tilt sensor was unplugged AND all six circuit board standoffs were sheared in two. Surprisingly the electronics continued to work, albeit without tilt.

- Proceed to assemble the components to perform a system functionality test.

- Take care to save all packing material so the system can be returned.

QUICK TEST
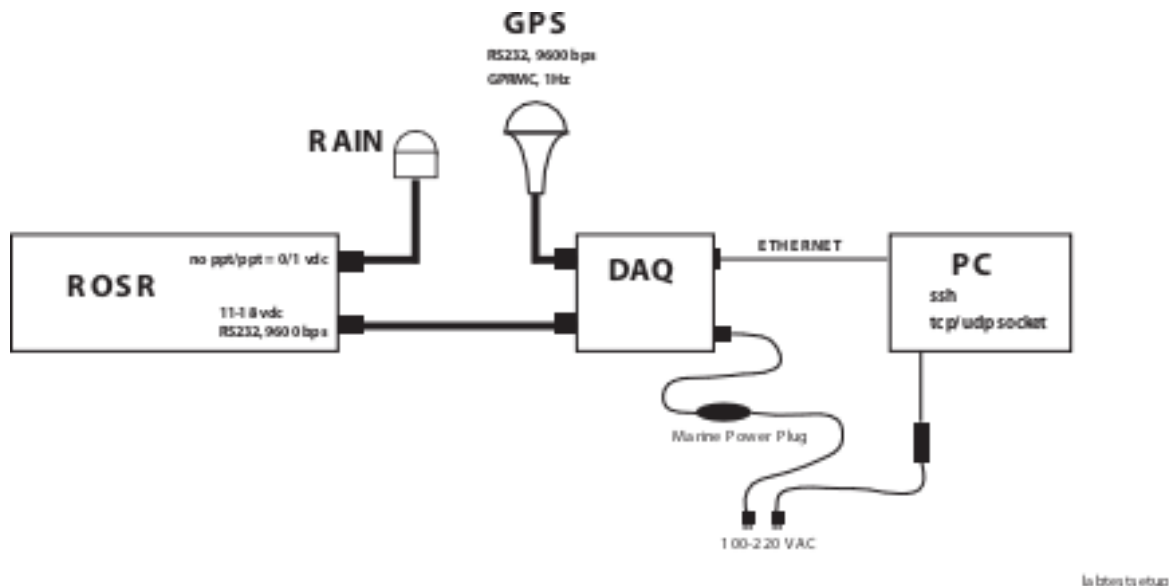
- Study the figure above and be assured you have all components.
  (ROSR, power/com cable, rain sensor, DAQ box, GPS, ethernet cable, AC power, laptop)
  A shorter ethernet can be used in this test. Note: be sure the ethernet cable is good and that the laptop ethernet port is on. A small light at the laptop ethernet connector is on.

- Connect the system according to the diagram. Connection can be made in the shipping boxes as in the photo here.

Quick test in shipping cases.
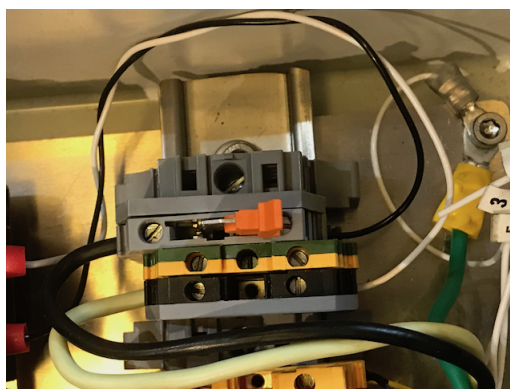
ON/OFF switch in the OFF position.

- Plug in the DAQ box and laptop to AC.

- Turn on the laptop and let Linux boot up.

- Open the DAQ box and press the small knife switch down (ON).

- Open a terminal window on the laptop; press $\boxed{\texttt{<control>-<alt>-t}}$ followed by `F11` for full screen. The prompt is `~/swmain/apps/ROSR/sw $`.

- If this DAQ has an iboot power control enter $\boxed{\texttt{booton}}$.

- Confirm ethernet connectivity by `ping -c3 192.168.255.1`. If the connection is good you will see the ping times in ms. Stop here if you have no connectivity. (Note that the default IP# for the serial server, hub, is 192.168.255.1 and the IP# for the iBoot control is 192.168.255.2. Ping should work for either of these.)

- Enter `Date` to check the PC time is within a few seconds of UTC.

- If necessary, set the PC time with the command `SetDate r0srr0sr yyyy MM dd hh mm ss` where yyyy is the year, MM is the month, dd is the day, hh is the hour, mm is the minute, and ss is the second. The year is four digits and the rest have two. Example: `SetDate r0srr0sr 2019 03 06 20 04 00`. Time is set when you press enter. Enter `Date` for the PC time to confirm.

- Clear old data with `Wipe y` which erases the data folder.

- `Start` data collection. Data collection is a background process.

- `Raw` shows the raw output from the ROSR. You should see data lines coming each 2 seconds. End this display with `^c`

- **Test Rain Sensor**
  Tap fingers or spit on the rain sensor and confirm that the weather shutdown occurs. The rain flap closes and LED#1 is a solid red. Use the `Raw` command and observe the last two data fields before the '*' which are the rain voltage and the secs to open. During rain these are `1.0,120*`. About 2 minutes after the rain stops and the dome is dry the rain switch opens and the numbers are `0.0,tt*` where tt is the secs to begin data collection. When tt counts down to zero the flap opens and sampling restarts.

- End the test with `Stop`, `Wipe y`, and `RosrShutDown`. Disconnect the power.

- Remove all cables and return the parts to their boxes. Save packing foam for the return shipping.

ASSEMBLE THE FRAME

- Necessary tools are a ratchet drive with a long 9/16" socket, an adjustable wrench, rachet 3//8" box end wrench, and a cordless drill with a 9/16" socket. These tools will make the assembly much easier. All bolts are 3/8" type 316 stainless steel and 9/16" wrenches are required.

- Identify all the pieces according to the photo. Remove the plastic ties and tape used in packing.

- Lay down the two legs upside down from that shown in the photo.
  Attach the top strut. Note the struts are marked 'A','B',etc and their location on the legs are co-labeled. It should be easy to install the four struts.

- Turn the frame over and attach the shelf brackets as shown.

- Note the two struts with bolts for the DAQ box. Double check the photo and be sure it is correctly placed. It is best to install the box after the frame is secure.
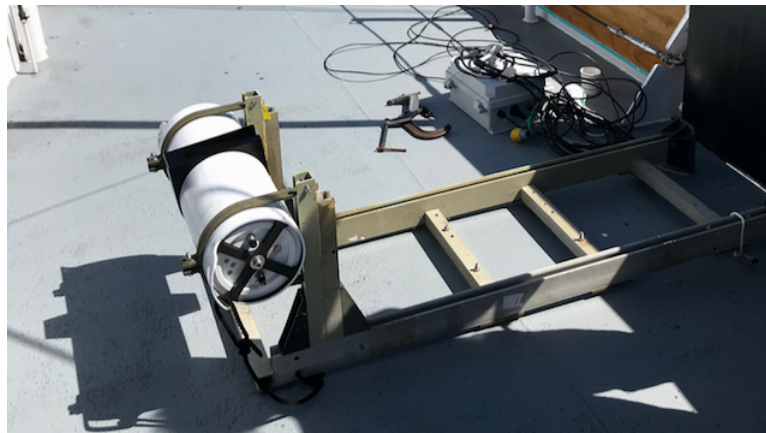
LOCATION LOCATION

Select a location outside of the wake.

- Port side is preferred because the ship usually docks on its starboard side..

- As high as possible to minimize spray.

- The default pointing angle is 45° but it can be adjusted to 55°. If possible try to work with 45°.

- AC power should be from an uninterruptible power supply (UPS). On some ships the UPS is called "scientific" power.

- On the cruise use a level to view the ROSR angle to confirm you are outside the wake.

INSTALLATION

The frame and all components are moved to the installation location.

- Place the PC in its interior location. Connect AC and turn on.

- Secure the frame on the railing. NOTE that it might be best to install the ROSR with the frame on the deck (photo) and then left the frame into position

- Tie the safety line (included) from the ROSR to the ship railing.

- Make sure all components are securely mounted: frame, DAQ box, GPS, Rain sensor and ROSR.

- Route the ethernet cable from the PC to the DAQ box. Be careful of the fragile ethernet connectors. The most reliable ethernet connection is a direct connection from the DAQ to the PC, possibly via switches, hubs. The best connection is one long cable from the DAQ box to the PC. This works best for individual research cruises and there is no need to change IP numbers

- Carefully plug in the weatherproof ethernet connector and screw on the cap.

- Connect all cables: GPS, Rain, ROSR, AC power. Open the DAQ box and be sure the AC switch is closed. The installed connections are described above.

- Tidy up. Use small plastic ties or tape to secure loose cables. Secure any spooled excess cables.

- Return to the PC and follow the steps in the Quick Start section above. This will ensure all components are working properly.

- `Start` will begin data collection. `iss` confirms a process is running.

- `Raw` shows the raw output from the ROSR. You should see data lines coming each 2 seconds. End this display with $^\wedge$c.

- `help` and `helpa` provide a very brief tutorial of the commands that are available. Read these and understand the different commands. Note you must press 'q' to end the display.

DAILY BACKUP

It is not necessary, but it is a god idea to do a daily backup. This prevents files from becoming too large and gives you a daily file to send out for troubleshooting.

Remember the acronym SAWS and you can perform this as often as needed.

S `Stop` – Stop data acquisition.

A `Archive` – Make a compressed archive file in `/home/rosrdata/`.

W `Wipe y` – Remove everything from the `../data/` folder.

S `Start` – Resrart data acquisition.