NIP Radiometer Replacement Procedure

I. Purpose:

This document describes the steps for removal and replacement of the Normal Incidence Pyrheliometer (NIP) sensors in the Tropical Western Pacific sites.

II. Cautions and Hazards:

- Removal and replacement of the NIP on the side of the solar tracker requires two people: one to hold the instrument and the other to remove the attaching screws.
- Handle the NIP carefully, and avoid touching or scratching the instrument window.
- Remember to log the serial number of the instrument being removed, the serial number of the instrument being installed, and the version number of the ZENO data logger configuration on the Replacement Record Form provided.

III. Requirements:

- Shipping box for radiometer
- Replacement procedure form
- Standard allen key set
- Notebook PC with proper serial cables and adapters for communicating with data logger.

IV. Procedure:

A. NIP Sensor Replacement

Before starting the following procedure, make sure the data logger data has been recently uploaded to ADaM. This will help prevent unnecessary data loss during the steps involving changing the configuration file in the ZENO data logger.

1. Prepare a replacement procedure form with all serial numbers and other information. Be sure to complete this form and get information from both the instrument being removed and the instrument being installed.
2. The NIP being removed will either have a 4-pin Bendix connector or an black cable coming through a grommet on the back panel. If it has a connector, disconnect the signal cable from the back of the

instrument. If it has a hard-wired cable attached to it, disconnect that cable from the data logger.

3. While one person holds the NIP, another should carefully remove the four hex-head cap screws holding the two brackets around the NIP body. (3/16" allen wrench should be used – but it's a good idea to have a full set of standard allen wrenches in case the size varies between installations.) These brackets must be completely removed to allow the NIP to be taken off.
4. Remove the old NIP and pack it safely in its case for shipping.
5. Unpack the new NIP from its shipping case and place it in the NIP mount with its window toward the sun (or toward the direction of the shade arm, if the sun is unavailable). Making sure the NIP alignment target is not obstructed, reattach the NIP mounting brackets and tighten the screws with the allen wrench. The NIP should be secure, and should not rotate around its axis or slide forward or backward.
6. The instrument being installed should have the 4-pin Bendix connector on the back. If the old instrument also had this connector, plug the signal cable into the back of the new NIP. If not, a 4-pin Bendix to 6-pin XSEE cable will be needed to get the signal from the instrument to the logger box.

B. ZENO Configuration

1. Connect a notebook PC to the SKYRAD data logger using the appropriate adapter.
2. Advance or jump to the appropriate record in the Sensor Menu. Refer to the SKYRAD ZENO Sensor Configuration Table.
3. Enter the calibration values for the new sensor into the data logger. The NREL calibration sticker on the side of the NIP base gives a number in V/Wm^{-2}. The reciprocal of this number is the value to be entered into the data logger configuration.
    - If a calibration of the data logger has a documented voltage offset for this channel, determine the appropriate Sensor Menu offset by multiplying the voltage offset by the sensor calibration. An offset less than 1 W/m^2 is not significant. Note that the Sensor Menu offset requires the opposite sign of the voltage offset.
    - If an offset is being used for this channel, determine the new Sensor Menu offset by dividing the old offset by the old sensor calibration and multiplying it by the new sensor calibration.

(Note: the sensor calibrations are usually sufficiently close to one another to use the same offset.) An offset less than 1 W/m^2 is not significant.

4. Change the Configuration Version Number in the Data Output Menu to include the current date.
5. Save the changes to EEPROM.
6. Use the Test Menu to view the Raw and Scaled (calibrated) data.
7. Download the new Configuration to the notebook computer using the naming convention SKYsssn.txt where sss is the data logger serial number and n is an alphabetic version number.
8. Terminate the connection by selecting Quit.
9. Disconnect the notebook computer and connect the logger to ADaM.
10. Download the new ZENO configuration to ADaM.
11. Record all new serial numbers on the daily checklist and site operations log.
12. Make sure all information is filled out on the instrument replacement procedure form.
13. Enter the date, start time, end time, and comments into the Site Operations Log.
14. Send the sensor serial number and a copy or a listing of the SKYRAD configuration file to the sensor and data logger mentors.

V. References:

1. “PSP Rad Sensor Replacement Procedure” for more information on ZENO configuration changes.

VI. Attachments:

1. None.