APPLICATION NOTE NO. 72   Revised March 2008

Setting Up WET Labs ECO-FL Fluorometer with Bio-Wiper™

This application note applies to the following models of the WET Labs ECO-FL Fluorometer with Bio-Wiper:
- **ECO-FLNTUS** chlorophyll and turbidity sensor
- **ECO-FLS** chlorophyll sensor
- **ECO-FLCDS** CDOM sensor

These sensors can be configured to operate in Profiling or Moored mode:
- **Profiling mode** – The ECO-FL opens the bio-wiper when power is applied and keeps it open continuously, even when power is removed. The ECO-FL samples continuously when powered, and outputs a voltage that changes as the data changes.
- **Moored mode** – The ECO-FL opens the bio-wiper when power is applied, takes a sample, outputs a voltage, closes the bio-wiper, and holds the voltage until power is removed.

When Sea-Bird integrates the ECO-FL with one of our CTDs, we set up the ECO-FL to operate in the mode appropriate for the CTD. However, you may want to change the mode in the future, if:
- You purchased the ECO-FL for use with an SBE 19*plus* or 19*plus* V2, which can be field configured to operate in either profiling or moored mode.
- You wish to use the ECO-FL in the future with another CTD; for example, you purchased the ECO-FL for use with an SBE 25 profiling CTD and now want to use it with an SBE 16*plus* V2 moored CTD.

Changing the ECO-FL Setup

To change the ECO-FL configuration, connect the ECO-FL **directly** to the computer and to a 12 V power source, using the cable supplied by WET Labs. Configure the ECO-FL using a terminal program (WET Labs provides a graphical interface program, ECOView, which can be used instead of a terminal program – see www.wetlabs.com).

The required comm port settings are: 19200 baud, 8 data bits, no parity.

Configure ECO-FL for Profiling Mode	*Configure ECO-FL for Moored Mode*
Send the following commands: !!!!! $set 0 $pkt 0 $sto	Send the following commands: !!!!! $set 1 $pkt 1 $sto

Notes:
1. Five exclamation points (!!!!!) accesses the ECO-FL command set.
2. For the $set and $pkt commands, the space between the command and the number is important. For example, make sure that there is a space between $set and 0.
3. The $sto command stores the settings in memory. If you omit this line, the sensor defaults to its last stored settings.

After you have configured the ECO-FL for your CTD, reconnect the ECO-FL to the CTD.

Setting Up/Using the CTD in Moored Mode

General

Delay before sampling sets the amount of time to wait after switching on external voltages before sampling. The ECO-FL requires approximately 3.5 seconds to sample, if set up to take a single measurement for each sample (longer time required for multiple measurements per sample). Therefore, set:

- **DelayBeforeSampling=** (16*plus* and 16*plus* V2 RS-232 version, and 19*plus* and 19*plus* V2 in moored mode), or
- **#iiDelayBeforeSampling=** (16*plus* and 16*plus* V2 RS-485 version, and 16*plus*-IM and 16*plus*-IM V2)

to greater than the expected time required for the ECO-FL to sample.

Newer CTD firmware

- SBE 16*plus* (RS-232) firmware version ≥ 1.6d (October 2004 and later) and all 16*plus* V2 (RS-232)
- SBE 16*plus* (RS-485) Digital firmware version ≥ 1.0c (May 2005 and later) and all 16*plus* V2 (RS-485)
- SBE 16*plus*-IM Digital firmware version ≥ 1.1b (May 2005 and later) and all 16*plus*-IM V2
- SBE 19*plus* firmware version ≥ 1.4f (May 2005 and later) and all 19*plus* V2

Sea-Bird added a Bio-Wiper command to the command set, to ensure that the Bio-Wiper automatically closes after sending the status command:

Command	Description
BioWiper=x (16*plus* and 16*plus* V2 RS-232 version, and 19*plus* and 19*plus* V2) or **#iiBioWiper=x** (16*plus* and 16*plus* V2 RS-485 version, and 16*plus*-IM and 16*plus*-IM V2)	**x=Y**: Configuration includes WET Labs ECO-FL fluorometer with Bio-Wiper. CTD is powered longer (total of 8 seconds) for status command, providing 4 seconds for Bio-Wiper to open and then shut again if in Moored mode. **Note:** 4 seconds for the Bio-Wiper to open and shut is sufficient for the typical application, with the ECO-FL set up to take a single measurement for each sample. However, the ECO-FL can be user-programmed to take and average a number of measurements for each sample; **if averaging multiple measurements, 4 seconds may not provide sufficient time for the Bio-Wiper to close**. Use the **TV**, **TVR**, or **TS** command (**#iiTV**, **#iiTVR**, or **#iiTS** for RS-485 or IM versions) after the status command, as described below for older CTD firmware, to ensure the Bio-Wiper closes for these applications. **x=N** (default): Configuration does not include ECO-FL with Bio-Wiper.

Older CTD firmware (not applicable to any of the V2 SEACATs)

- SBE 16*plus* (RS-232) firmware version ≤ 1.6c
- SBE 16*plus* (RS-485) Digital firmware version ≤ 1.0a
- SBE 16*plus*-IM Digital firmware version ≤ 1.1
- SBE 19*plus* firmware version ≤ 1.4d

In older CTD firmware, power was not provided for enough time for the Bio-Wiper to close after the status command (**DS** for 16*plus* RS-232 version and 19*plus*; **#iiDS** for 16*plus* RS-485 version and 16*plus*-IM) was sent if the Bio-Wiper was in Moored mode. If the user did not notice that the Bio-Wiper was still open, and then deployed the CTD on a mooring with a delayed start time, the ECO-FL could become fouled, because the Bio-Wiper would not close until after the first sample was taken.

For these older firmware versions, after sending the status command:
Send the **TV**, **TVR**, or **TS** command (**#iiTV**, **#iiTVR**, or **#iiTS** for RS-485 version or IM versions) and then wait at least 10 seconds to cycle the Bio-Wiper open/closed. Verify that the Bio-Wiper has closed before deploying.