

ECO User Guide

I. Manual Commands

A. Command Structure

- 1) All manual commands begin with a "\$" character, followed by a 3 letter mnemonic followed by <enter> (also known as "carriage return-line feed" <CR><LF>).
- 2) If the command is changing an instrument setting/parameter, the command has the "\$", the mnemonic, a space (or "=" character), and the argument... followed by <enter>.
- 3) All settings need to be stored to Flash memory with the "\$sto<enter>" command.
- 4) The case is NOT sensitive, upper or lower are the same
- 5) The "RT" (real-time (i.e. "FLRT")) instruments do not have Date/Time columns nor memory capability.

NOTE: the Date/Time fields have "filler" values (using "9"s): "99/99/99" and "99:99:99" are displayed in the first two columns.

B. Command Overview

- 1) Typical deployment configuration settings include these parameters:

Pkt - # of samples (i.e. "\$pkt 15<enter>" or "\$pkt=15<enter>") NOTE: "0" is used for continuous output.

Set - # of cycles; (i.e. "\$set=50000<enter>") NOTE: this parameter is disregarded if "Pkt" is "0"; it can also be set to "0" for continuous sets (no limit)

Cal - engineering output column (ug/l) enable/disable (1/0); (\$cal=1<enter>)

Rec - memory enable/disable (1/0); (\$rec=1<enter>)

Int - cycle interval, time between "Set" (hhmmss, < 240000); (\$int 001000<enter> (10 mins))

Dat - date, mmddyy; (\$dat 121814<enter> (December 18, 2014))

Clk - time, hh:mm:ss; (\$clk 172500<enter> (5:25 pm))

One parameter that probably does not need to be changed is "Ave". This parameter is the number of averaged sample groups to be processed before the data record is transmitted via the serial RS-232 output line and stored into memory. The default "Ave" setting sends data output at 1 Hz. The "Ave" value for the default (1 Hz) output varies depending on the ECO optics configuration, output channels (1, 2, or 3).

- 2) Retrieving data:

Get - sends the contents of memory in ASCII (text) format; (\$get<enter>)

NOTE: the ECO will automatically start sampling and sending data (simultaneously) upon power ON. The analog voltage signal (0-5V) and serial data stream are available simultaneously

Emc - clears the memory (erase memory counter): "\$emc<enter>".

- 3) Command to interrupt (stop) the sensor:

"!!!!!" - stop command (series of exclamation marks (>5)); this puts the ECO into Standby

NOTE: when the stop command is successfully interpreted by the ECO, the sampling stops and the deployment parameter settings are displayed. The listing of parameters is referred to as a "Menu".

Mnu - display the parameter settings (instrument is in Standby); (**\$mnu**<enter>)

4) Command to start the sensor (if in Standby):

Run - restart the sampling; (**\$run**<enter>)

NOTE: this command is NOT necessary when the ECO is first powered ON.

II. Data format

A. Data Overview

- 1) The basic output record of the single-channel ECO FL contains the following columns of ASCII characters:

Date, Time, CHL header, CHL signal, Therm

- 2) Each column is "Tab" delimited. NOTE: the data should be parsed with this in mind, since the columns are NOT all fixed-width.
- 3) Each record ends with a <CR><LF>
- 4) The "CHL signal" column varies between 2 - 5 bytes, depending on the magnitude of the signal
- 5) "Date" & "Time" columns are 8 bytes
- 6) "CHL header" & "Therm" columns are 3 bytes
- 7) "CHL engr" column varies between 4 - 6 bytes, depending on the magnitude of the signal
- 8) The "Therm" column is NOT a calibrated signal. It is used for factory diagnostics, but does not have a physical temperature characterization performed. It is an on-board (internal) CPU chip thermistor signal. It varies inversely to the internal temperature of the ECO, between 480 - 600 counts (~530 for room temperature, 23C).
- 9) Additional optics channels add two columns per channel to the output record, preceding the "Therm" (last) column. For example, a 2-channel (i.e. FLNTU) adds an "NTU header" and an "NTU signal" between the "FL" columns and "Therm" column.

B. Format examples

- 1) ECO FL Columns:

Date, Time, CHL header, CHL signal, Therm

Example:

01/28/14	15:29:43	695	47	531
01/28/14	15:29:44	695	48	531

2) ECO FL Columns w/ "Engr" output (Cal) enabled:

Date, Time, CHL engr, CHL header, CHL signal, Therm

Example:

12/18/14	23:05:17	129.02	695	16380	537
12/18/14	23:05:18	129.02	695	16380	537

3) ECO FLNTU Columns:

Date, Time, CHL header, CHL signal, NTU header, NTU signal, Therm

Example:

04/21/15	11:34:51	695	50	700	52	530
04/21/15	11:34:52	695	50	700	52	530

4) ECO BBFL2 Columns:

Date, Time, BB header, BB signal, CHL header, CHL signal, CDOM header, CDOM signal, Therm

Example:

05/19/15	12:00:45	700	50	695	52	460	50	535
05/19/15	12:00:46	700	50	695	52	460	49	535

C. Miscellaneous

- 1) The ECO instruments have a hardware option for a battery pack for autonomous operation. The internal battery pack is enabled via an additional 3-socket (MCBH-3-FS) bulkhead connector connected to the internal battery pack. The battery pack is connected to the ECO power input circuit via an external battery bulkhead connector "shorting" plug. When the plug is inserted, the internal battery pack will power the instrument immediately, starting the automatic sampling settings.

The internal power connections on this host connector are in parallel to the (optional) battery power connector and are diode-protected against one another for reverse power protection.

- 2) The ECO's ship with a 6-pin MCBH-6-MP host power & I/O connector. Test cables are available. The test cables have a standard serial RS-232 (DB-9) connector serial. A test cable option is available for measuring the analog voltage output on the 1 & 2-channel instruments. The ECO Triplet does not have any analog voltage outputs.
- 3) The baud rate is not field-configurable, set at 19200 baud. There are other slower baud rates available, if required... but, these are also hard-configured in the firmware. I will find out if these can be increased.
- 4) The memory is not configurable. The ECO has on-board static RAM, with enough capacity for 108,000 records for the single channel sensors. The additional output fields on the 2 & 3-channel ECO's reduce the total number of records: 90,000 (2-channel); 77,000 (3-channel).
- 5) The data records are written to memory in binary format, downloaded as a converted ASCII output.