NEON Standard Operating Procedure: EXO2 Multisonde Data Management Procedure

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See configuration management system for approval history.

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Change Record

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Figure 18. Multisonde Serial Number Location
1 DESCRIPTION

1.1 Purpose

The purpose of this document is to provide standard instructional guidance on how to enable and disable logging, in addition to downloading, storing and transferring data for the EXO2 Multiparameter Sonde (herein referred to as the Multisonde or Sonde).

1.2 Scope

The operating procedures herein apply to managing data for the Multisonde sensors at stream Aquatic Instrument Sites (AIS) in the event of a power outage or under the direction of AIS Science. Data management procedures include data collection (logging), transmission and storage (downloading the data from log files and transferring them to the network drive) using KorEXO Software Version 1.0.12. This procedure does not apply to lake and river sites (i.e., Multisondes that collect measurements from a buoy).
2 RELATED DOCUMENTS AND ACRONYMS

2.1 Applicable Documents

The following applicable documents (AD) contain mandatory requirements and/or supplementary information that are directly applicable to the topic and/or procedures herein. Visit the NEON Document Warehouse for electronic copies of these documents.

| AD [01] | NEON.DOC.001569 | NEON Preventive Maintenance Procedure: AIS Surface Water Quality Multisondes |

2.2 Reference Documents

The reference documents (RD) listed below may provide complimentary information to support this procedure. Visit the NEON Document Warehouse for electronic copies of these documents.

| RD [01] | NEON.DOC.000008 | NEON Acronym List |
| RD [02] | NEON.DOC.000243 | NEON Glossary of Terms |
| RD [03] | NEON.DOC.001166 | NEON Sensor Command, Control and Configuration (C3) Document: Multisondes, Stream |
| RD [04] | NEON.DOC.004419 | Stream or Lake Water Level Formal Verification Procedure |
| RD [05] | NEON.DOC.003880 | NEON Preventive Maintenance Procedure: AIS Stream Infrastructure |
| RD [06] | NEON.DOC.004886 | NEON Preventive Maintenance Procedure: Aquatic Portal & AIS Device Posts |
| RD [07] | NEON.DOC.005048 | NEON Installation Procedure: HB066000XX- Subsystem, Sensor Infrastructure, Stream, [Sand, Bedrock, Cobble] |

2.3 External References

The external references (ER) listed below contain supplementary information relevant to this procedure. These documents are external to the NEON program and Battelle.

| ER [01] | YSI Incorporated, EXO user manual, www.EXOwater.com |

2.4 Acronyms

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<th>As Required</th>
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<tr>
<td>P/N</td>
<td>Part Number</td>
</tr>
<tr>
<td>AIS</td>
<td>Aquatic Instrument Site</td>
</tr>
<tr>
<td>CVAL or CVL</td>
<td>Calibration, Validation and Audit Laboratory</td>
</tr>
<tr>
<td>fDOM</td>
<td>Fluorescent Dissolved Organic Matter</td>
</tr>
<tr>
<td>S1</td>
<td>Upstream</td>
</tr>
<tr>
<td>S2</td>
<td>Downstream</td>
</tr>
<tr>
<td>SOA</td>
<td>Signal Output Adapter</td>
</tr>
<tr>
<td>UTC</td>
<td>Coordinated Universal Time</td>
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3 OVERVIEW

3.1 Components

This document includes components from the following assemblies:

- **HB07530000** Assembly, Multisonde with Sensors, FDOM
- **HB07530010** Assembly, Multisonde with Sensors, No FDOM

3.2 Subsystem Location and Access

Multisondes reside at both core and relocatable AIS sites. Access to AIS sites require Aquatic PPE and may require a boat. At wadeable stream sites, the Multisondes is part of both the upstream (S1) and downstream sensor set (S2), or single station sensor sets.

4 FIELD DATA MANAGEMENT PROCEDURE

**IMPORTANT:** For stream sites, this procedure requires KorEXO Software Version 1.0.12. Download KorEXO via *N:\Common\CVL\Field_Calibration\EXO2 Software and Firmware*.

If a Multisonde at a site is logging data in accordance with the procedures herein, download the log files and replace the D-cell batteries every two (2) weeks. If you are unable to reach the Multisonde due to seasonal weather or other site dynamics, download the log files as frequently as possible.

4.1 Equipment

<table>
<thead>
<tr>
<th>Part Number (P/N)</th>
<th>NEON P/N</th>
<th>Description</th>
<th>Quantity</th>
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<tr>
<td>NEON IT/YSI</td>
<td></td>
<td>Laptop with KorEXO Version 1.0.12 and associated FTDI drivers, as applicable</td>
<td>1</td>
</tr>
<tr>
<td>YSI</td>
<td></td>
<td>USB Signal Output Adapter (SOA) Cable (If connecting to the Sonde via USB)</td>
<td>1</td>
</tr>
<tr>
<td>GENERIC</td>
<td></td>
<td>Alkaline D-Cell Batteries or NiMH D-cell Batteries with a minimum rating of 10,000 milliamp hours (Multisonde internal batteries)</td>
<td>4</td>
</tr>
<tr>
<td>GENERIC</td>
<td></td>
<td>Magnet (If connecting via Bluetooth)</td>
<td>1</td>
</tr>
<tr>
<td>YSI</td>
<td></td>
<td>Multisonde Tool (To open battery compartment or wake-up the Multisonde for Bluetooth)</td>
<td>1</td>
</tr>
</tbody>
</table>

💡 **PRO TIP:** Recommend downloading the KorEXO/LoggerNet software on a loaner laptop to use in the field to prevent damaging the laptop you use daily for the NEON program. This procedure may require FTDI Drivers if you are using a loaner or new laptop. Download the drivers here [http://www.ftdichip.com/FTDrivers.htm](http://www.ftdichip.com/FTDrivers.htm) or via *N:\Common\CVL\Field_Calibration\Drivers\FTDI*. If you have a new laptop or loaner laptop with newly installed KorEXO software, update the drivers, if necessary/applicable, while you have internet connection at the Domain. Plug the adapter into a USB port on your laptop while connected to the internet. Click the window that pops up in the lower right of...
the task bar. This should open a Properties window for the USB device. Click the "Driver" tab, and then select "Update Driver".

4.2 Connect to a Multisonde: Communication Settings

There are two ways to connect to a Multisonde: 1) via a USB connection (Figure 1) and 2) via Bluetooth (Figure 2). Reference AD [01] for more information on both methods.

![USB to Sonde Connection Method](image1)

Figure 1. USB to Sonde Connection Method

![Bluetooth to Sonde Connection Method](image2)

Figure 2. Bluetooth to Sonde Connection Method

Activate Bluetooth with a magnet swipe at the magnetic activation area. Bluetooth is on when the blue LED is lit. When the blue LED is off, the Bluetooth is disabled. When the light is on continuously, the Bluetooth is enabled, but no link has been established. When the blue LED blinks at 2 Hz, the Sonde’s Bluetooth is on and linked with your laptop or other compatible device. When the red LED is off, the Sonde is either off or asleep and not logging. When it blinks at 0.1 Hz (once every 10 seconds), the Sonde is asleep and logging is enabled. When the red light blinks at 1 Hz, the Sonde is awake and has no faults. If the red light is lit continuously, the Sonde is awake and has detected faults that require fixing prior to use.

**PRO TIP:** Any strong magnet is capable of waking up the Sonde. If you are unable to wake up the sensor using a magnet or Multisonde tool, or do not have a magnet available, pop the battery cover to activate (wakeup) the sensor.

**Note:** If the Multisonde internal batteries drops below 5.5 Volts, the Bluetooth connection may not work. Use the USB cable if you think the battery voltage may be low onsite. If the Multisonde is directly connected to a power source, HQ recommends using the Bluetooth connection.
4.3 Enable Logging Procedure

When enabling logging on the Sonde, disconnect the cable from the Grape, if applicable for your site, and replace the (4) internal D-Cell batteries every two weeks. Disable logging when removing the Sonde from the water to prevent the collection of bad data. Reference Section 4.4 for instructions on how to disable logging on the Multisonde.

1. Open the KorEXO software on your laptop and navigate from the Menu bar to the Deployment Settings (click on the green arrow icon in Figure 3).

2. Then select **Open a Template** (Figure 4).
3. In the file folder pop-up window, choose a deployment template and click Load (Figure 5).

4. In the Template Edit window, update the Template Name to “DXX_SITE_yyyymmdd_Serial#” (A in Figure 6) and set the Logging Interval to five (5) minutes (B in Figure 6). Ensure the Deployment Time Zone is UTC (Coordinated Universal Time). When complete, click the green arrow at the bottom of the pop-up window to continue (C in Figure 6).
5. The Multisonde loads the template and verifies the sensor settings (Figure 7). If you encounter a dialogue box requesting confirmation on the settings and to continue with the deployment, click “Continue”.

6. When the Select Log Start Time window appears, select a custom time approximately 10 minutes in the future from the current time (Now) to start data collection on an even five (5) minute interval and click “Apply” (Figure 8).
7. After the settings load, confirm that logging is enabled by clicking on Read Current Sonde Settings. Logging is enabled if the “Stop Deployment” button displays and Logging “Enabled” is indicated in the Current Deployment Summary table. (Figure 9).

Figure 8. Select a Custom Time ~10 Minutes from the Current Time to Start on an Even 5 Minute Interval

Figure 9. Read Current Sonde Settings to Verify Logging is Enabled
4.4 Disable Logging Procedure

Disable logging when removing the Sonde from the water to prevent the collection of bad data. If unable to cease logging immediately, note the time/date when the sensors were out of the water and use the trouble ticketing system to communicate the time range for bad data to HQ science for possible manual flagging.

1. Open the KorEXO software and navigate to Deployment settings, reference Step 1 in Section 4.3, Figure 3. Navigate to Deployment Settings. Click “Stop Deployment” to stop the Multisonde from collecting data (Figure 10).

![Figure 10. Click “Stop Deployment” to Stop the Multisonde from Collecting Data](image)

2. A Stop Deployment dialogue box will appear asking for confirmation and acknowledgement to stop data collection (Figure 11). Click “Apply” to confirm and “OK” to acknowledge and proceed to the next section.

![Figure 11. Confirm and Acknowledge Deployment is being Stopped](image)

4.5 Data Download Procedure

Download the Multisonde files onto a laptop to transfer them to the network drive for AQU SCI on a biweekly (every two weeks) preventive maintenance cycle. Follow the instructions in this section, in addition to using the following file naming convention per Section 4.7 when uploading the files to the Sensor Swap > Sonde folder: DXX_SITE_yyyymmdd_Serial#
1. In the KorEXO software, select the blue file folder in the top menu bar to download the data (Figure 12).

![Figure 12. Select the Blue File Folder to Download the Data](image)

2. Select “View/Export” (Figure 13).

![Figure 13. Select "View/Export"](image)

3. Select the file you wish to download by clicking the smaller blue file folder icon (Figure 14).

![Figure 14. Select the Smaller Blue Folder Icon to Select the Log File to Download](image)

4. In the Select File window, click on the file created when the logging was initially enabled (see Section 4.3) and then click “OK” (Figure 15).

![Figure 15. Select the File](image)
5. Click on the paper icon to export the data to CSV (called a **KOR Export File** in Figure 16).

6. Save the file to your computer to upload the file to the network drive per Section 4.7.

### 4.6 Deleting Data File Procedure

The Multisonde has an internal logging memory capacity of 512 MB. At the sampling interval of 5 minutes, the Multisonde has the capacity to hold files for a long duration (12+ months). When initiating a new deployment, clear all log files from previous deployments.
4.7 Data Upload Procedure

After returning to the Domain Support Facility or via VPN, change the name of the log files to “DXX_SITE_yyyymmdd_Serial#” where “DXX” is the domain, “SITE” is the location, “yyyymmdd” is the date of the data download, and “Serial#” is the serial number found on the Multisonde body bar code label. Save a copy to the Network drive in the following folder (Figure 17):

N:\Science\Sensor Swap\Sonde

The serial number on the Sonde is located under the EXO2 model label barcode (16B103174 is the serial number in Figure 18 below).

Maintain a local copy of the files for at least two (2) years to have backup files in the event of an emergency (if HQ requires files to be re-uploaded to another or same location).