Introduction

As part of the effort to map the world ocean by 2030, the Seabed 2030 Project, along with the IHO Data Center for Digital Bathymetry (DCDB) at the National Centers for Environmental Information, Boulder, have collaborated to provide and manage small hardware data loggers that are used to collect bathymetric data from volunteer observers. Depending on the systems running on the volunteer observer's vessel, these can be NMEA0183 loggers, such as the TeamSurv NMEA Data Logger, or the NMEA2000 loggers, such as the Yacht Devices Voyage Recorder (YDVR-04N).

This document provides some basic information on the loggers, and how to connect them to vessel systems.

NMEA0183 Loggers

The TeamSurv NMEA0183 logger is a small (11x5.5x2.5cm approx.) box with six screw terminals for connection to the vessel's systems on the right and space for a USB memory stick on the left (Figure 1). The system must be provided with DC power (in the range 9-36V, but 12V strongly preferred), and be securely mounted using the mounting holes in the bottom bracket in an area which is accessible (to change the memory stick), but also adjacent to the echosounder, GPS, or other instrument (e.g., a chart plotter) that is providing the data.

NMEA0183 is a differential signaling system (a form of RS-422), which means that the data from the instrument(s) is carried on two wires for each channel, usually marked "A" and "B". The logger has two sets of terminals, marked "Ch 1" and "Ch 2" for these connections, each of which has an "A" and "B" terminal. The "A" and "B" wires on a channel must be connected to the corresponding wires on the instrument for the system to receive data, and the matching of the wires (i.e., "A" on logger to "A" on instrument, etc.) is very important. The simplest connection (e.g., for a chart plotter with integrated GPS and echosounder) is to have all of the data on a single channel, and this is preferred where possible.

Unfortunately, there is no standard for how each instrument exposes its "A" and "B" wires for transmitting data, and therefore each installation will have to identify the cables or terminal strips to which to connect, and which of the two wires is "A" and "B" before making final connections. Typically, this information is available in the technical documentation for the instrument generating the data, or may be described in the vessel's documents or technical plan. Where possible, use shielded twisted pair cable; if this is impossible, a simple twisted pair of wires for the connection is possible if the distance is short, Figure 2.

Once the system is installed, power is indicated by the lower left indicator LED, while data being written is indicated by the top left LED. Data arriving at either channel is indicated by the right hand LEDs. If data is expected, but the LEDs do not light, the first trouble-shooting measure is to swap the wires for the channel (i.e., switch the "A" and "B" wires). After that, consult the technical documentation for the logger.

Figure 1 (right): The NMEA0183 data logger from TeamSurv. Note the six screw terminals on the right to connect the device to the vessel's systems, and (not visible) USB terminal for a memory stick to the left.
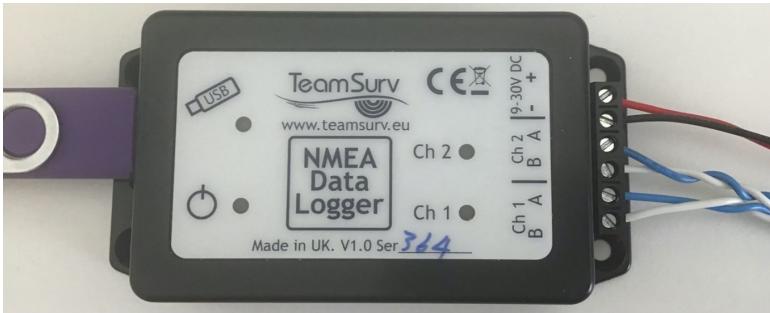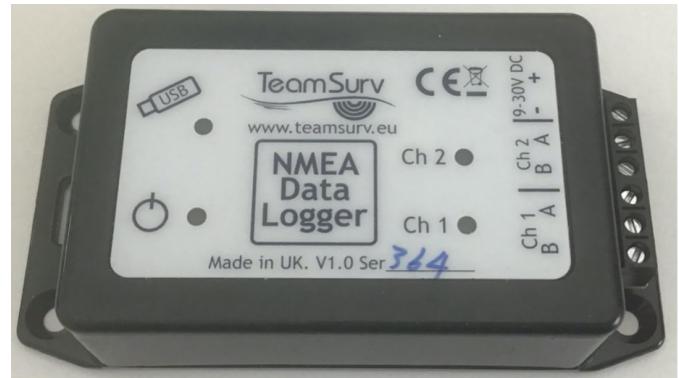
Figure 2 (left): The NMEA0183 data logger connected to power (red/black wires) and two channels of data (blue/white twisted pairs) and a USB stick for recording data (left).

NMEA2000 Loggers

The Yacht Devices logger, Figure 3, is a small (7 cm x 2.5cm dia.) cylinder with a five-pin male connector on one end, and a micro-SD card slot on the other. Unlike NMEA0183, NMEA2000 has a very strict standard for connectors, which means that connecting the device to the network is essentially a matter to mating it to a drop cable, Figure 4, which is polarized through the small plastic flange inside the plug so that it can only be inserted one way. Tighten down the screw cap completely in order to ensure a tight (usually water resistant) seal. In addition to data, the NMEA2000 bus provides power, so there is no requirement for further connections. Ideally, the logger should be mounted somewhere that is dry and readily accessible, since the micro SD card will have to be swapped periodically to transfer data ashore and into the DCDB.

Figure 3 (above): The Yacht Devices Voyage Data Recorder (VDR) for recording NMEA2000 data, showing the main device body (right) and NMEA2000 connector (left) with polarized plug.

Figure 4 (above): The Yacht Devices data recorder connected to a NMEA2000 drop cable, ready to collect data.

Data is recorded to a micro SD card, which is inserted into the end of the data logger, Figure 5. The socket is a push-push type, meaning that the card has to be pushed in to seat, and again to release. The data logger assumes that the micro SD card is formatted as FAT32 file system, but this is typically done at the factory.
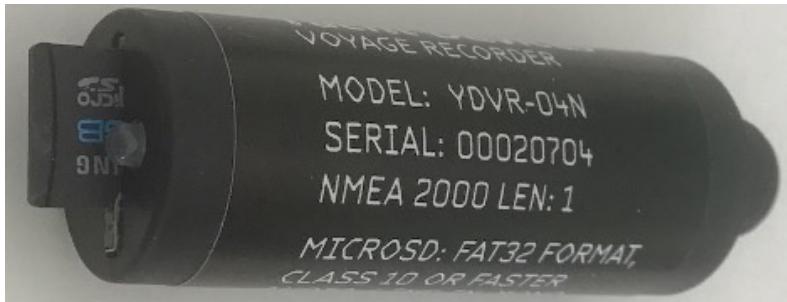
Figure 5 (left): Inserting the micro SD card into the Yacht Devices recorder. The card socket is a push-push type, so the card fully inserted (bottom) needs to be pushed again to release (top) for removal. Data being accepted will be indicated on the adjacent LED.

The logger comes pre-configured with factory settings for what to log, but this can be tuned. The DCDB/Seabed 2030 can provide a copy of the recommended standard configuration file, which can be installed by simply copying it to the SD card before inserting it into the logger (the configuration file must be called "YDVR.TXT" and must be saved in the top-level folder of the SD card).

It is possible that this file might fail if Yacht Devices change the format of the parameter file in subsequent versions of the firmware running on the logger. If this happens, please inform DCDB/Seabed 2030, and if possible, include a copy of your current configuration file by providing the "YDVRSAVE.TXT" file, which you should find in the top-level folder of the SD card that the logger is currently using (this is made by default once the logger starts).

If required, you can make your own configuration file from the defaults by copying it to your computer, editing it with a plain text editor (e.g., Notepad++ on Windows, or TextEdit on macOS) according to the instructions in the file, and then copying it back to the SD card with the name changed to "YDVR.TXT". The new configuration will be loaded as soon as the logger restarts. We suggest at least turning off audio logging, which might (significantly) reduce the amount of storage being used by the logger, allowing for longer recording times. **Please contact Programming@SeaKeepers.org with questions or assistance with modifying your configuration file.**