

STANDARD OPERATING PROCEDURE
Use, Calibration and Maintenance of the Manta Water Quality Multiprobe

KEY WORDS

Temperature, conductivity, dissolved oxygen (DO), pH

APPROVALS

APPROVED BY: Original Signed By DATE: 10/10/06
Kean S. Goh, Ph. D.
Environmental Monitoring Branch Management

APPROVED BY: _____ DATE: 10/10/06
Frank C. Spurlock, Ph. D.
Environmental Monitoring Branch Senior Scientist

APPROVED BY: _____ DATE: 11/1/06
Carissa Ganapathy
Environmental Monitoring Branch Quality Assurance Officer

PREPARED BY: _____ DATE: 11/1/06
Milanka Ilic
Environmental Research Scientific Aide

Environmental Monitoring Branch organization and personnel, such as management, senior scientist, quality assurance officer, project leader, etc., are defined and discussed in SOP ADMN002.

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1.0 INTRODUCTION

1.1 Purpose

This document discusses the proper technique for using and maintaining the Manta Water Quality Multiprobe. The Manta is used for continuous measurement of temperature, conductivity, dissolved oxygen (DO), and pH of a water body *in-situ*. Adding sensors for measuring depth and turbidity of the water is optional. The frequency of data recording interval is adjustable. The Manta is accompanied by the Amphibian (pocket PC), a data collection and transfer utility. The Amphibian is used in the field to collect data from the Manta as well as to transfer data to a PC.

1.2 Definitions

- 1.2.1 Amphibian – Hand-held field PC used for downloading data from the Manta (Figure 1).



Figure 1. Manta Multiprobe with the Amphibian

- 1.2.2 MBP- Manta Battery Pack

- 1.2.3 Analite – Brand of turbidity and surface tension measurement instruments.

2.0 MATERIALS

- 2.1 Manta
- 2.2 Amphibian
- 2.3 Metal chain (1/2" -1/4") or nylon rope
- 2.4 Mounting stake or a pole
- 2.5 8 alkaline "D" cell batteries
- 2.6 Soft cleaning brush (i.e. toothbrush)
- 2.7 Desktop PC or a laptop

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2.8 Eureka Software

2.9 Manual

2.10 Manta Calibration Cup (provided with the Manta probe)

3.0 PROCEDURES

3.1 Calibrating the Manta Probe

See Table 1 for range and accuracy specifications. Clean and perform routine maintenance if necessary prior to calibration (Sect. 3.9)

3.2 Dissolved Oxygen Calibration

- 3.2.1 Make sure the circulator is turned off. The ON/OFF knob is located next to the bolt used to remove MBP (see figure 2.). To turn off, move the knob to O.
- 3.2.2 Turn Manta upside down. Place the calibration cup on and fill up to the level of the DO membrane with tap water, DI water, your conductivity standard or a pH standard. Using high salinity standard during an air calibration is also allowed. But do not cover the DO probe surface with the liquid. (Manual pg. 22)
- 3.2.3 Using a paper towel, dry the membrane and make sure it is free of water droplets (Figure 2).
- 3.2.4 Place the calibration cup cover onto the calibration cup and wait for approximately two minutes.
- 3.2.5 Next connect the Manta to a PC or the Amphibian (with Eureka program installed). To connect the computer cable to the Manta, first remove the metal screw at the top of the Manta. Then gently pull off the waterproof cap. Connect computer cable plug in the hole and USB end of cable into the PC.
- 3.2.6 Open the Multiprobe Manager program. Click on **Calibration**, and then click on **Calibrate** for the appropriate sensor (e.g. DO).
- 3.2.7 Follow the displayed instructions to complete the calibration.
- 3.2.8 Calibrating the DO % saturation will also calibrate the DO in mg/L.
- 3.2.9 If you used pH buffer or Conductivity standard, add more to your

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calibration cup and proceed to that calibration. If not, pour out the tap water.

3.3 pH Calibration

pH is a two or a three-point calibration. The buffers for a two-point calibration should be chosen based on the pH level of the sample water. Choose the buffers that bracket the pH of the sample water.

- 3.3.1 Rinse with a pH buffer and then fill the calibration cup with enough buffer to cover the pH glass bulb.
- 3.3.2 Open Multiprobe Manager program.
- 3.3.3 Click on **Calibration**, and then click on **Calibrate** for the appropriate sensor.
- 3.3.4 Follow the displayed instructions to complete the calibration.
- 3.3.5 Discard the buffer, add the second buffer and calibrate. Repeat steps 2 and 3 for a three-point calibration.
- 3.3.6 Using pH 7 buffer is not required and the order of buffers does not matter.

3.4 Conductivity Calibration – calibrates specific conductance and salinity.

- 3.4.1 Fill the calibration cup to cover conductivity sensor standard solution.
- 3.4.2 Tap gently on the cup to make sure there aren't any bubbles trapped in the conductivity sensor.
- 3.4.3 Connect the Manta to a PC or the Amphibian (with Eureka program installed).
- 3.4.4 Open the Multiprobe Manager program.
- 3.4.5 Click on **Calibration**, and then click on **Calibrate** for the appropriate sensor.
- 3.4.6 Follow the displayed instructions to complete the calibration.

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3.5 Programming the Manta probe for field deployment

- 3.5.1 Install the software provided with the Manta probe. The Manta Manager icon will be placed on your PC desktop.
- 3.5.2 Using the USB cable, connect the Manta to your PC.
- 3.5.3 In the **Logged Data Screen**, choose **Logging Profile** button. This will allow you to specify the description of the log as well as the reading interval (2 min., 2 hrs, etc.). Once the desired settings are entered click **Set profile** to save these settings. Manta will now operate accordingly with the settings entered.

3.6 Using the Manta probe in the field

- 3.6.1 Calibrate the Manta probe if necessary by following 3.2 through 3.4.
 - 3.6.1.1 The need for calibration will vary with the type and amount of usage. The probe should be calibrated if it is being used in different environments and/or if any of the sensors are being replaced or cleaned (i.e. replacing the DO membrane).
- 3.6.2 Prior to a long-term deployment, new batteries should be installed.
 - 3.6.2.1 The Manta can automatically log data for up to 30 days without requiring replacement of batteries.
- 3.6.3 Remove the storage cup and install the weighted sensor guard.
- 3.6.4 Hang probe vertically so that the sensors with the weighted sensor guard are at the bottom.
- 3.6.5 Make sure the sensors are completely submerged in the water and that they will remain submerged if water level recedes.
- 3.6.6 Secure the probe.
 - 3.6.6.1 There is no particular method for securing the probe, as it varies with the environment in which the probe is being used. Using stainless steel chain (1/4" to 1/2") or nylon rope works well in creeks. The probe should be mounted onto a pole at a desired position in the stream. To avoid possible theft, a waterproof pad lock may be used.

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3.6.6.2 The probe should be mounted so it allows for occasional removal, as it may need to be taken out of the water for data transfer or battery change.

3.6.7 Once the probe is secured in the water, switch the MBP knob to ON (marked **I**) to start a logging sequence.

3.7 Downloading data in the field using the Amphibian

3.7.1 Safely remove the Manta probe from the water to a dry area where downloading can take place.

3.7.2 Using a dry cloth, remove excess water and mud from the top of the Multiprobe, untwist the bolt (located in the center of the black lid) and remove the lid. Do not lose the bolt!

3.7.3 With both the Manta and the Amphibian running, plug in cable connector to topside of the Amphibian and the topside of the Manta.

3.7.4 Once connected, the Amphibian will recognize the Multiprobe and begin to record data.

3.7.5 From the Amphibian screen, go to the Function Menu (at the bottom of the screen) and click on **Log**.

3.7.6 Next, select the option **Download Sonde Flie** you mean File? to begin downloading data.

3.7.7 When prompted, name the file where the data will be stored and allow for downloading to finish.

3.7.8 The data will be saved in the Amphibian and you can exit the logger.

3.7.9 Unplug the Amphibian connector (cable) from the Manta and replace the lid, making sure that the bolt is in place and secured.

3.8 Downloading data onto a PC

3.8.1 Using the USB cord, connect the Manta to the PC. The Eureka Multiprobe Manager window will automatically start once the Manta

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is detected. At this time the Manta will be ON regardless of the MBP knob position.

- 3.8.2 Click on the Logged Data button. A table containing the logged data will appear and it may contain more than one file. This is due to the built in memory of the Manta probe, which can store data for about 327 days at 15-minute intervals. Once a file is full it automatically creates a new one, resulting in multiple files.
- 3.8.3 To save data to a desired location, click on "Export readings within specified time period", select the wanted dates and specify the wanted location using Log directory button.
- 3.8.4 After downloading the files, you may choose to delete files from the Manta by highlighting them and clicking the delete button. This will not delete the data already saved on your PC.

3.9 Transferring Data from the Amphibian to the Desktop PC

- 3.9.1 Using the USB cable, connect the Amphibian to the desktop PC.
- 3.9.2 On your desktop, double click on the Eureka icon. In the new window, click on Transfer. The Transfer utility will automatically connect to the Amphibian using Microsoft ActiveSync synchronizing software. Once connected, the location folder structure contained on the Amphibian will be displayed. At this point, the data contained on the Amphibian is transferred to your PC.
- 3.9.3 By default, the contents of \My Flash Disk\Eureka will be displayed. To switch to a different file, use the drop down menu.
- 3.9.4 To select the destination file for your data to be transferred to, use the **SET DESTINATION** button and select the desired location.
- 3.9.5 To view the detailed log of data transferred from the Amphibian, use the **VIEW LOG** button.

3.10 Cleaning and Maintenance (Refer to the Manta Manual pg. 14-21 for photos)

- 3.10.1 Conductivity Sensor - Clean if biological growth or mud is present.

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- 3.10.1.1 Gently clean the inside with a cotton swab. Use a small amount of rubbing alcohol or warm soapy water. DO NOT use sand paper or any abrasive materials.
- 3.10.2 Dissolved Oxygen Sensor - If Manta is being used only for several hours a day and is properly stored in water, the membrane and electrolyte should last for several months
 - 3.10.2.1 Wash sensor stem with soap and water. Using a soft cloth and rubbing alcohol gently clean the membrane. DO NOT use any abrasive materials to clean membrane.
 - 3.10.2.2 If the membrane appears to be wrinkled, baggy or dirty, or contains a hole, replace the membrane and electrolyte (for a detailed description refer to manual, pg 15). Flush with fresh electrolyte solution when replacing membrane.
 - 3.10.2.3 If there appears to be a large air bubble under the membrane, replace membrane and electrolyte.
 - 3.10.2.4 If the dissolved oxygen sensor will not calibrate replace membrane and electrolyte.
- 3.10.3 pH Sensor
 - 3.10.3.1 Clean flat glass pH bulbs with a soft cloth and alcohol. DO NOT use any type of abrasive materials on the bulbs.
- 3.10.4 pH Reference
 - 3.10.4.1 Clean junction (the white part in the middle of the black tip) with a soft brush. DO NOT attempt to clean a discolored junction, as this is a normal occurrence.
 - 3.10.4.2 Replace reference solution periodically. Replace (refill) reference if there is an air bubble. Replace the junction (tip) if it is clogged and will not allow reference solution pass through when you replace the reference.
- 3.10.5 Depth/ Vented Level
 - 3.10.5.1 Make sure there isn't anything blocking the sensor opening.

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Use a stream of water to remove any algal growth. DO NOT stick anything into the opening.

3.10.6 Turbidity

3.10.6.1 Periodically inspect the wiper pad to determine if the material is deteriorating or is impregnated with material from biofouling. In addition, as a precaution, it is recommended that you change the wiper prior to each long-term deployment.

3.10.6.2 Clean optics with warm soapy water. Take care of the optical window. DO NOT allow this to be scratched.

3.11 Replacing Batteries

3.11.1 Clean and dry the MBP and unscrew the large plastic bolt (Figure 2).

3.11.2 Remove the cap and clean any contaminants left on the o-rings.

3.11.3 Remove all eight spent batteries and replace with new ones, installing them the "+" end away from the Manta sensors.

3.11.3.1 Use only alkaline "D" cell batteries.

3.11.4 Replace the top cap and tighten it.



Figure 2. Manta Battery Pack (MBP)

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3.12 Long term storage

- 3.12.1 When the Manta is not being used, it should be stored with a small amount of tap water in the storage cup. Do not use other solutions or allow it to freeze.
- 3.12.2 If the MBP will not be used for a long period of time, the batteries should be removed to prevent leaking inside of the MBP. Store in a plastic container at room temperature.
- 3.12.3 For long-term storage of the Amphibian, remove the pocket PC from the Amphibian and connect it to the docking charger cable provided by the manufacturer.

4.0 REMEDIAL ACTION IN CASE OF MALFUNCTION

- 4.1.1 In the case of malfunction of any software or hardware associated with the Manta Multiprobe (and its components) contact Rick Bertrand of Eureka, at 512-302-4333 ext: 111.

5.0 REFERENCES

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Austin, TX 78758
Tel: 512-302-4333
Fax: 512-323-6911
www.eurekaenvironmental.com

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6.0 APPENDIX A

Table 1

- Performance specifications are affected by calibration and maintenance. For best results, clean and calibrate your instrument on a periodic basis.

Parameter	Range	Accuracy	Resolution
Temperature	-5°C- 50°C	± 0.08°C	0.01°C
Dissolved Oxygen (mg/L)	0-50 mg/L	± 0.2 mg/L ≤ 20mg/L ± 0.6 mg/L > 20mg/L	0.01 mg/L
Dissolved Oxygen (%Sat)	0-200% 200-500 %	±2.4 % ±7.2 %	0.1
Specific Conductance	0-5 µS/cm 5-25 23-112	±5% reading ± 0.001 ±5% reading ±5% reading	4 digits
pH	2-12 units	±0.2 units	0.01 units
ORP	-999-+999 mV	±20 mV	1 mV
Salinity	0-70 PSS	±1% of reading + 1 count	0.01 PSS
Ammonia/Ammonium	0-200 mg/L - N	± 10 % of reading or ± 2 mg/L - N whichever is greater	0.1 mg/L - N

- Calibrate near sample conditions for best results.

* PSS- Practical Salinity Scale (Argulananthan)