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TURNER DESIGNS

1995 N. 1st Street San Jose, CA 95112 Phone: (408) 749-0994 FAX: (408) 749-0998

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WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE) DIRECTIVE

Turner Designs is in the business of designing and selling products that benefit the wellbeing of our environment. Accordingly, we are concerned with preserving the surroundings wherever our instruments are used and happy to work with customers by complying with the WEEE Directive to reduce the environmental impact resulting from the use of our products.

WEEE Return Process:

To arrange the return of an end-of-life product, proceed as follows:

If you purchased your instrument through a Turner Designs Distributor please contact your local representative. They will instruct you where to return the end-of-life product.

If you purchased your instrument directly from Turner Designs please contact Turner Designs Customer Service By Phone: 1-408-212-4041 or Toll Free: (877) 316.8049 By Email: Customer Service at <u>support@turnerdesigns.com</u> Turner Designs will provide a WEEE RMA Number, a Shipping Account Number, and a Ship to Address. Package and ship the product back to Turner Designs.

The product will be dealt with per Turner Designs' end-of-life recycling program in an environmentally friendly way.

1. Introduction

1.1 When oil spill response teams are dispatched to the scene of an oil spill it is critical they have the proper instrumentation to monitor the areas of contamination and the effectiveness of dispersants and burning techniques. The Special Monitoring of Applied Response Technologies (SMART) protocol was developed to guide responders identifying and mapping very low concentrations of Crude Oil originating from spills in natural waters. This system provides responders and government agencies a powerful, reliable and easy-to-use platform to collect and process oil spill data. You can learn more about the SMART protocol at the link below:

http://response.restoration.noaa.gov/oil-and-chemical-spills/oilspills/resources/smart.html

It is necessary to have both the Turner Designs C3 Submersible Fluorometer and the Instrumentation package for a complete SMART system.

2. Inspection and Identification

2.1 Instrument Checklist

The SMART package includes:

- C3 Submersible Fluorometer with Crude Oil Sensor and SMART Firmware installed. *Additional sensors available.
- Factory-installed temperature sensor
- Factory-installed Pressure sensor
- C-ray Towed Deployment Body
- C-ray Shade Cap
- Antifouling Copper Tape
- Interface cable for communicating with your PC and supplying power to the instrument
- Integration / Interface Adapter Cable
- Continuous Data Cable
- 25-meter Extender Cable
- Booster Kit
- Portable 12 Volt Power Supply
- Transport Case
- SMART Oil Spill Response Laptop with SMART Kit software bundle installed.
- USB Flash Drive including SMART Operators Guide, Windmill Manual, NOAA SMART procedure, C-Soft software, C3 User's Manual, Cable Guide, and Quick Start Guide

2.2 Identification

Sensors are marked with numbers 1, 2, or 3 located adjacent to the optics on the face of the C3 Submersible Fluorometer. These numbers correspond to channels 1, 2, and 3 in C-Soft (C3 software). *Note: Channel names can be modified using C-Soft.*

Light emitting diode color table.

| Application | Light Source Color | | | |
|----------------------------|---|--|--|--|
| In Vivo Chlorophyll | Blue | | | |
| | Red | | | |
| Turbidity | Infrared (No Color) | | | |
| Phycocyanin | Yellow-Orange | | | |
| Phycoerythrin | Green | | | |
| Fluorescein | Blue | | | |
| Rhodamine | Green | | | |
| CDOM/FDOM | Ultra Violet (No Color)* | | | |
| Refined Oils and Fuels | Deep Ultra Violet (No Color)* | | | |
| Crude Oil | Ultra Violet (No Color)* | | | |
| Optical Brighteners | Ultra Violet (No Color)* | | | |
| PTSA | Ultra Violet (No Color)* | | | |
| Tryptophan | Deep Ultra Violet (No Color)* | | | |
| *Do wot look diwoothy of t | he entire. Illustric let light een he demening te | | | |

*Do not look directly at the optics. Ultraviolet light can be damaging to the eyes.

Crude Oil must be in Channel 1 for SMART firmware.

3. C3 SMART Software Setup Guide

Connect the Turner Designs C3 fluorometer to the computer before starting the computer. Use the yellow interface cable for SMART operations.

- 1. Plug the serial connector of the cable into your computer.
- 2. Plug the interface cable onto the 8-pin bulkhead connector of the instrument.

The black interface cable is reserved for instrument firmware communications. Do not supply power to the fluorometer at this time.

3.1 C-Soft Software Setup and Operation



1. Start Windows and open the C-Soft software by double clicking on the C-Soft icon.

| C-Soft Ma | | | | | | | | | - 8 |
|------------|-------|--------------------------------|----------|---|-----------|------------------------------------|------|--|--------------------|
| e vettings | CO | M Port V/Indox COM1 COM2 | Vielp | | | Connected | | | |
| Settings | | COM4 COM5 COM5 | og Setup | Download Data | | | | | |
| Channel Se | sting | 2 | | | | | | | |
| | Enabl | e Nome | | Serial # | | | | | |
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| unan 2 | M | Cydops 2 | 121 | | | | | | |
| chan 4 | | Cydeps 3 | | | | | | | |
| Lhan 4 | 1 | Cydeps 4 | 121 | | | | | | |
| than 5 | 14 | Cydeps 5 | | | | | | | |
| Chan 6 | P | Cydops 6 | (4) | | | | | | |
| Depth | P | | | | | | | | |
| Temp | | | | | | | | | |
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2. From the "COM Port" drop down menu select "COM 1" then supply power to the C3 fluorometer.

| -Soft Ma | nage co | i M Dork - Wind | Halp | | | _0 |
|-----------------------------|------------|--------------------|-----------|----------------|--|--------|
| Journa | | aror with | on map | | Connected 🔵 | |
| :ttings hannel Se | Cur | rent Data | Log Setup | Download Data | | |
| 1 | Enable | e Name | | Serial # | | |
| Chan 1 | 7 | OI | | | | |
| Chan 2 | Г | Cyclops 2 | | | | |
| Chan 3 | Е | Cyclops 3 | T | | Turke Balance 1 Inch | |
| Chan 4 | Г | Cyclops 4 | | | | |
| Shan 5 | E | Cyclops 5 | | _ | Progress | |
| Chan 6 | Е | Cyclops 6 | T | | | |
| Depth | • | | | | | |
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| | Adot | e Acrobat Sta | indard | C-Soft Manager | Ozi Tradis 🕺 🕤 🧭 🛄 💭 🖗 | Tuesda |

3. The instrument should initialize within a minute or two. If not, unplug the power to the instrument, restart the C-Soft software and try again.

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|----------------------------|-------|------------------|-----------|---------------|---|
| | | | | | Connected 🥘 |
| ttings hannel Se | Cu | rrent Data Js | Log Setup | Download Data | C-Soft Manager |
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| han 2 | E | C2 | T | | 6/9/2009 |
| han 3 | | C3 | | | |
| han 4 | Г | C4 | T | | Current Time |
| han 5 | С | C5 | 1 | | 6/9/2009 |
| han 6 | E | C6 | | | |
| Depth | • | | | | Manually Set Unit Date & Time |
| Temp | | | | | |
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4. After the instrument has initialized, click on the "Set Unit Clock" button to open the "C-Soft Manager" window, then click on the "Set Unit To PC Date & Time" button. This synchronizes the C3 clock with the PC clock.

| | -Soft Manager | <u>_ ×</u> |
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| | Connected 🕒 | |
| (| titings Current Data Log Setup Download Data namel Settings Enable Name Enable Image: Setal Top Seta | |
| | Set Unit Clock | |
| | | |

5. If the C3 has more than one sensor installed make sure the "Enable" box for the "OIL" channel is the only channel box checked then confirm that the "Depth" box is checked.

| Settings | COM | Port Window | Help | | | |
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| han 3 | | Turbidity | | | | |
| han 4 | | C4 | | | | |
| han 5 | | cs | | | | |
| han 6 | | C6 | | | | |
| Depth | | | | | | |
| Temp | | | | | | |
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6. It is recommended that the internal data log be cleared before the start of a mission. To do this, select the "Download Data" Tab.

7. Then click on the "Clear Datalog" button and click on "OK" in the "Clear the datalog?" message box.

| File Settings COM Part Window Help | Connecte | et 🥥 |
|--|----------------|------|
| Settings Current Data Log Setup Download Data Used Data Log (%) | C-Seft Manager | |
| Download Data Cear Datalog | | |

8. Wait while the data is erased from the internal data log.

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9. Select the "Current Data" tab and confirm that new data is being received from the instrument. If no data appears in the Data Table close the C-Soft software, power down the instrument and repeat the Software Start-Up procedure.

| | | | | Data Table | 20 | | Deele | · Southern | C. | | | |
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| | | | | 18/30/10 13: | 46:36 | 1.12 | 0.00 | 21.75 | 11 | | | |

10. While in the "Current Data" tab, click on the "Calibrate" button next to the "Depth (meters)" display box to open the "Depth Dialog.vi" window.

11. In the "Depth Dialog" window wait for a stable reading in the "Current Pressure" display box then click on the "Set Zero" button. Verify that the "Atmospheric offset only" button is selected and click on the "Save Calibration" button. This will calibrate the C3 to read zero depth at atmospheric pressure.

| <u>Cna</u> | nnel Calbraton |
|---|--|
| Unit Label Depth | Current Pressure 15.00 PSI |
| Step 1 Press 'Set Zero' to set the atmospheric zero. | Zero Reading 15.00 Set Zero |
| Step 2 Select a pressure compensition method. | Atmospheric offset only Atmospheric and gravity offset |
| Step 3 When you are done, press "Save Calbrahon", or press "Cancel" at any time to abort this calbration. | Save Calbration Cancel |

12. While in the "Current Data" tab confirm that the depth readings are at or close to zero. If not, repeat the depth calibration process.

| | | | | Data Table | | Display i | waveform 🗖 | | |
|--------------|---------------|-----------|---------------|---|------------|-----------------|------------|-----|---|
| ettings Car | rent Data | Log Setup | Download Data | Dats/Time | OI RPUB | Depth meters | teno < | | |
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| PRIMAL DANCE | | | | 11/30/03 13:46:12 | 0.00 | 0.00 | 21.73 | | |
| | | | and and | 15/30/10 13:46:13 | 0.00 | 0.00 | 21.73 | | |
| han 1 | 01 | 0 | Calbrate | 11,00,00 13:46:14 | 1.00 | 0.00 | 21.73 | | |
| | | | | 15/30/00 13:46:15 | 0.25 | -0.06 | 21.73 | | |
| Chan 2 | | 0 | Calbrote | 11/30/03 13:46:16 | 0.00 | -0.06 | 21.73 | | |
| | | | | 11/30/00 13:46:17 | 0.00 | 0.00 | 21.73 | | |
| than 0 | C3 | 0 | Calbrate | 11/30/00 13:46:18 | 0.00 | 0.00 | 21.79 | | |
| | | | | 11/30/00 13:46:19 | 0.00 | 0.00 | 21.73 | | |
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| | | | | 15/30/00 13:46:33 | 0.24 | 0.00 | 21.73 | | |
| | | | | 11/30/03 13:46:34 | 0.00 | -0.06 | 21.73 | | |
| Video C | albration Do | 43 | | 11/30/00 13:46:35 | 0.00 | 0.00 | 21.73 | | |
| | | | | 11/30/03 13:46:36 | 1.12 | 0.00 | 21.73 | | |
| | | | | 11/30/00 13:52:57 | 0.00 | 0.00 | 21.60 | | |
| | | | | 11/30/00 13:52:50 | 0.00 | 0.00 | 21.68 | | |
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13. Next, select the "Log Setup" tab and confirm that the "Log Start" date and time is at or earlier than current PC time. Then change the "Sampling Interval" to 0:00:05 and click on the "Enable Datalog" button.

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14. Click on the "Yes" button and wait for the C-Soft software to close. After C-Soft closes, power down the C3.

Note: Configuring the C3 for external data logging need only be done once. After that, the instrument can be powered up and powered down without re-configuring the C-Soft software. The instrument will maintain the data logging settings until manually changed within the C-Soft software.

3.2 Windmill Logger Software Setup and Operation



1. Now, double click on the "LOGGER.EXE" icon on the desktop to open the Windmill logging application.

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Click on the "Start" button in the C3 Log window. If the "Logger – File Exists" window appears, click on "Append" to add to an existing file or "Overwrite" to erase the existing file and create a new one. Once the SMART logger window opens power up the C3 fluorometer. It generally takes about 2 minutes for the instrument to start sending data.

Note: If you do not see valid C3 data within a few minutes of powering up the instrument close Windmill Logger, power down the fluorometer, and restart the computer. Then repeat the C3 Software Start-Up procedure from the beginning.

3.3 Windmill Chart Software Setup and Operation

| Parts Parts | and the second s | | 5 | · ? | - 14 | |) | |
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| 15:10:30 | 010955 | 0.00 | 0.00 | 22.47 | 6110.558 | 4356.5521 | | |
| 15 10 48 | 011005 | 0.00 | 0.00 | 22.47 | 6110.558 | 4956 5521 | | |
| 15:10:53 | 011010 | 0.00 | 0.00 | 22.45 | 6110.55B | 4956 5521 | | |
| 15:10:58 | 011015 | 0.00 | 0.00 | 22.47 | 6110.558 | 4956.5521 | | |
| 15:11:03 | 011020 | 0.00 | 0.00 | 22.45 | 6110.558 | 4956.5521 | | |
| 15:11:08 | 011025 | 0.00 | 0.00 | 22.45 | 6110.558 | 4956.5521 | | |
| 15:11:13 | 011630 | 0.00 | 8.00 | 22.47 | 6110.558 | 4956.5521 | | |
| 15:11:18 | 0110.95 | 0.00 | 0.00 | 22.47 | 6110.558 | 4956.5521 | | |
| 15:11:23 | 011040 | 0.00 | 0.00 | 22.67 | 6110.558 | 4356.5521 | | |
| 15 11:33 | 011050 | 0.00 | 0.00 | 22.45 | 6110.558 | 4956 5521 | | 8 C 3 X |
| 15:11:30 | 011055 | 0.00 | 0.00 | 22.46 | 6110.558 | 4956.5521 | | |
| 15:11:43 | 011100 | 0.00 | 0.00 | 22.47 | 6110.558 | 4956.5521 | | |
| 15:11:48 | 011105 | 0.00 | 0.00 | 22.47 | 6110.558 | 4956.5521 | and the second second second | |
| 15 11:53 | 011110 | 0.00 | 0.00 | 22.47 | 6110.558 | 4356.5521 | | |
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1. Double click on the "CHART.EXE" icon on the desktop to open the Windmill charting application



2. Click on the "Start" button to begin charting the C3 data.

Note: The logged data is stored in the file C:\Windmill\Data\SMART.wl.



Note: The logging and charting applications can be stopped and started at will without affecting the flow of data from the C3 provided the "IML Device 0" application remains open. If the "IML Device 0" application is closed, the C3 must be powered down and the computer restarted to renew the data connection.

3.4 OziExplorer Software Setup and Operation



1. Click on the "OziExplorer" icon in the system tray to open OziExplorer.

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2. If OziExplorer opens without a base map or with the wrong base map, click on the "Load" button and select "Load Map File".

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| 19353_3 - KAMALO HARBOR.map | |
| 19353_4 - KOLO HARBOR.map | |
| 19353_5 - LONO HARBOR.map | |
| 19357_1 - ISLAND OF OAHU.map | |
| 19357_2 - BARBERS POINT HARBOR.map | |
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| | |
| File name: 19357_1 - ISLAND OF 0AHU.map | n |
| Files of type: Map Files (*.map) | |

3. The base maps are located in the files "C:\OziExplorer\Maps". Highlight the appropriate chart or map and press "Open". If no map is available for the area of operation see **Note 1** on page 21.



4. Using the "Zoom" buttons, zoom in or out to get the best view of the area of interest. To move the map on the screen, place the cursor on the map and press the left mouse button to drag the map image.



5. To start receiving the GPS signal, click on the "Start/Stop NMEA Communication" button. After a minute or so you should see "<NMEA>" flashing in the status box, this indicates a good GPS signal. If instead you see "<No Fix>" flashing in the box you have a poor signal and will not get reliable position data. To receive a better signal try repositioning the laptop closer to a window or move outdoors if possible.



6. You should see a trail as your position moves on the map, if not, make sure the "Show/Hide Tracks on Map" button is activated.



7. To set a marker at your present location press the Alt + K keys. This can be done as often as necessary and the markers will be numbered sequentially as they are created.



8. To stop tracking click on the "Start/Stop NMEA Communication" button.



9. By default OziExplorer saves the current track file to "C:\OziExplorer \Ozi Tracks\mmTrack.plt". To save the track file to another location click on the "Save" button and select "Save Track File" from the drop down menu. In the "Save Track" dialog box select a name and location for the file and click on "Save". Any waypoints or markers that were created during the mission can be saved in a similar manner by selecting "Save Waypoints to File" from the "Save" drop down menu. With the tracks and waypoints saved it is safe to close OziExplorer and turn off the computer.





10. Exporting OziExplorer files to Google Earth.



11. To save OziExplorer track and waypoint files to a .KML format (Google Earth) click on the "Save" button in the OziExplorer menu bar and select "Export to Google Earth".



12. Click on the "Select all items" button then click on "Save".



13. Browse to the desired file location, name the file according to the SMART file naming convention and click on "Save".

4. C-Ray Towed Deployment Body Assembly Guide



The C-ray Towed Deployment Body may be disassembled for storage or transport. To assemble the C-ray lay out the pieces on a flat surface.





In preparation for assembly place a washer on each of the two mounting screws and apply a light coat of thread locking compound to the threads.



Position the mounting tube so the threaded holes are positioned on top and near the operator.



Align the wing assembly as illustrated above. Position the wing assembly so the curved surface of the wings (the "foil") is facing downward.



Place the wing assembly on the body and line up the mounting holes.



Position the vertical wing assembly on top of the wing assembly and align the mounting holes for both wing assemblies.



Insert a mounting screw that you previously prepared with thread locking compound into the forward mounting hole. Finger tighten the screw for now. Caution: Only use the screws provided. Longer screws will damage the C3 fluorometer.

998-2321



Insert the second mounting screw that you previously prepared with thread locking compound into the rear mounting hole. Finger tighten the screw for now.



Tighten the forward mounting screw with an appropriate sized screwdriver.



Tighten the rear mounting screw.



Locate the shackle assembly that came with the C-ray.



Note: The C-ray has seven holes available for mounting the shackle. These holes allow for adjustment in how the C-ray will move through the water. Experience has shown that mounting the shackle in the fifth hole from the front is a good starting point. Further adjustment can be made as necessary.



Install the shackle as illustrated above. Tighten the nut and install the safety clip as shown.

Caution: Failure to install the safety clip may result in the shackle coming loose during towing operations.



Locate the retaining pins at the rear of the C-ray body.



Remove the two retaining pins and safety clips from the C-ray body.



Position the C3 fluorometer in the C-ray body and align the tabs on the C3 with the mounting holes on the C-ray. Insert a retaining pin.



Insert the second retaining pin. Some jiggling of the C3 within the C-ray body may be necessary to achieve proper alignment.



Insert the safety clips into each retaining pin.

Caution: Failure to secure the safety clips could result in the C3 slipping out of the C-ray during towing operations.



Install the C3 shade cap onto the front of the C3 Fluorometer and turn clockwise until the mounting threads engage and resistance is felt. Do not fully tighten the shade cap.



Continue to turn the shade cap clockwise until the flow-through slots are aligned with the bottom of the C-ray body. The O-ring on the C3 should provide for a snug fit through a range of shade cap positions. If a snug fit cannot be achieved with the slots aligned to the bottom of the C-ray, remove the retaining pins at the rear of the C-ray, rotate the C3 fluorometer 180°, reinstall the retaining pins and safety clips and reposition the shade cap.



The C-ray is now configured for towing operations.

5. C3 SMART Calibration Guide

The C3 Fluorometer has the option to be calibrated for a specific purpose such as SMART monitoring. For the C3 Fluorometer, calibration is a function of the instrument's software and is maintained in non-volatile memory. Thus, calibration need only be done on initial setup or if the instrument's firmware has been updated or re-installed. The following describes the calibration process for SMART protocol.

Connect the C3's data cable to the computer's serial port.

Open the C-Soft software then power up the Fluorometer. Wait for the instrument to initialize and the "Connected" button at the top of the C-Soft window to illuminate green.

Select the "Current Data" tab and click on the channel 1 "Calibrate" button to open the "Channel Calibration" dialog box.

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Fill a 4000ml glass beaker about half full of deionized water and place the C3 shade cap in the beaker. Submerge the C3 into the deionized water and carefully wipe away any bubbles from the lens with a gloved finger. Then, carefully rest the C3 on the open end of the shade cap.

| | Chann | Brealibration | |
|--------|--|---|---------------|
| Unit L | abel Chan 1:01 | Current RFU 3, | 2.24 |
| Step 1 | Press "Set Blank" to set the blank value to the current RFV. | Blank RFU 640.00 x1 84.00 x10 32.48 x100 | Set Blank |
| Step 2 | Enter the value of your standard and select the units of measure. | Standard Value | Units RFUB |
| Step 3 | Press "Set Standard" to set the standard value to the current RFU. | Standard RFU | Set Standard |
| Step 4 | Optional: Click the temperature compensation box to activate. | Temp Compensation | |
| Step 5 | After calibration is complete press | Save Calibration | Cancel |
| | Click to use uncalibrat | ed Raw Fluorescence Mode | 1 |

Wait for the readings in the "Current RFU" window to stabilize then click on the "Set Blank" button. This calibrates the instrument to read zero for de-ionized water. Leave the "Standard Value" box blank and select "RFUB" from the drop down menu in the "Units" box.

Click on the "Save Calibration" button to save the calibration and return to the main C-Soft window.

With the instrument still in the beaker of de-ionized water, confirm that the readings in the "Current Data" window are at or very near zero. If so, calibration is complete. If not, repeat the calibration process.