



The Oceanscience Group Riverboat User Guide



v1.2.0



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2.0 Introduction

Congratulations on your recent purchase of the Oceanscience Riverboat.

The Oceanscience Riverboat is the world-wide benchmark for acoustic Doppler current profiling for discharge measurements. The Riverboat and ADCP combination has drastically reduced discharge measurement time and labor all over the world. This rugged, stable, corrosion-resistant tethered boat makes safe, easy measurements of discharge with ADCPs. Relatively slow and fast flowing water can be handled with ease, and available radio communications options complete with the total discharge monitoring package.

The Oceanscience Riverboat has gathered data at water velocities over 15 fps (4.5m/s). The bow flare trimaran hull design prevents the boat from nose-diving and maintains instrument orientation by reducing pitch and roll in varied flows. The central hull reduces drag by a factor of 2-4 over catamaran designs making the Riverboat capable of operation in a range of water velocities, maximizing the data collection potential of the ADCP.

Made of unbreakable polyethylene, the Riverboat is strong and robust to cope with the worst deployment conditions. The standard boat fits an 8" TRDI Rio Grande ADCP and is configured for use of Oceanscience single-channel spread spectrum radio modems. All required cabling, batteries, and antennae are included for easy plug-and-play operation. Electronics are located below deck in a watertight compartment. Other Doppler profilers of 8" diameter or less may be used with adaptor mounts. The Riverboat can be supplied with a pigtailed wiring harness for user radio installation.

Optional equipment includes DGPS location and data handling options such as the powerful Oceanscience Oyster PE2 on-board computer or Hydrolink radio modems, to make the Riverboat the most versatile tethered survey platform available. Select the Oceanscience Sliding Crossbar option to easily disassemble the Riverboat for transportation in the available hard or soft cases.



3.0 Riverboat Specifications

RIVERBOAT SPECIFICATIONS	
Typical Measurement Water Velocity	2 - 10 fps (.6 - 3 m/s)
Maximum Water Velocity	15 fps (4.6 m/s)
Center Hull Length	48" (121cm)
Overall Width (Assembled)	32" (81cm)
Crossbar Material	Anodized Aluminum
Hull Material	Molded Unbreakable Polyethylene
Weight	15 lbs. (7kg)
Hardware	Aluminum
Safety Lines	Stainless Steel
Fasteners	Stainless Steel
Fin Configuration	Kick-up Fins
ADCP Size	8"

3.1 Riverboat Order Codes

RBHL – Riverboat for Hydrolink radios

RBPT – Riverboat with pigtailed wiring harness

SCBR – Sliding Crossbar

SCAS – Soft transportation case

HCAS – Aluminum ATA transportation case

RBFK – Riverboat Fin Kit

4.0 Riverboat Assembly and Installation

4.1 ADCP Installation

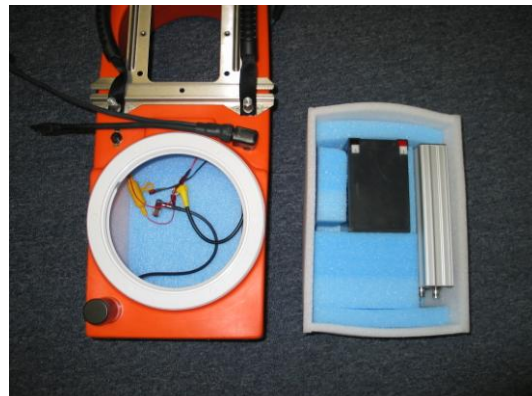
1. With the ADCP looking downward, sitting on its cap, install the $\frac{1}{4}$ -20 x 3" mounting studs. Insert the stud from above and install a lock washer and standard nut on the bottom, leaving no more thread than necessary protruding from the bottom of the nut. (See Figure 4.1)
2. Install a hex nut from the top, using wrenches provided to snug both nuts against the instrument flange. This will leave about $\frac{3}{4}$ " of thread protruding upwards to pass through the Riverboat crossbar and receive the wing nuts and lock washers.
3. Place the crossbar and hulls over the ADCP so that the threaded rods extend through the crossbar holes. Fasten in place with the wing nuts and lock washers, using the instrument safety cable in place of the fourth wing nut (see safety cable instructions, section 4.2).

Electronics Compartment

Figure 2 shows a sample transceiver / battery configuration. See your Hydrolink Transceiver manual for specific instructions about installing your electronics equipment if this pertains to your unit.



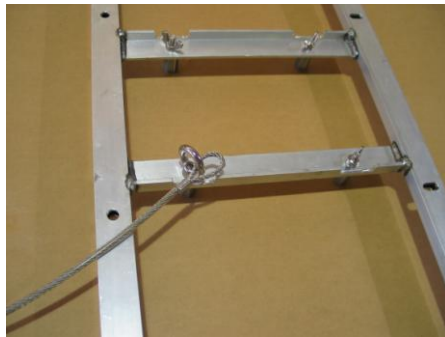
(Fig. 4.1) Mounting studs installed



(Fig. 4.2) Sample transceiver / battery configuration

4.2 Safety Cable Assembly and Installation

1. The safety cable provides a vital link from the ADCP to the tow line. Use the eye nut at one end of the safety cable to secure one of the forward ADCP mounting studs to the Riverboat crossbar (see Figure 4.3).
2. Attach the other end of the safety cable to the carabiner as shown (see Figures 4.4 and 4.5).



(Fig. 4.3) Safety cable eye nut placement



(Fig. 4.4) Standard crossbar with wire rope bridle and instrument safety cable



(Fig. 4.5) Safety cable, wire rope bridle, and carabiner ready for tow line

4.3 Standard Crossbar Assembly and Installation

(Proceed to section 4.4 if optional Sliding Crossbar was purchased)

1. Begin by attaching the Wire Rope Bridle to the crossbar using the ¼-20 nylock nuts as shown in Figure 4.6. Align the eyes horizontally so they do not protrude below the crossbar.
2. Next, attach the crossbar and strap handles to the main hull using the ¼-20 x 1 ¼" screws with flat washer above the strap grommet (see figure 4.7).
3. Attach the crossbar to the outriggers using the ¼-20 x 1" buttonhead screws with fender washers.
4. Install the kick-up fins on the inside of the hulls using the ¼-20 x ¾" buttonhead patch screws with lock washers. When you are ready to put the Riverboat in the water, rotate the fins downward into the desired position and tighten the retaining screws with the provided hex key.



(Fig. 4.6) Wire Rope Bridle and Instrument Safety Cable attached to the Standard Crossbar



(Fig. 4.7) Outrigger, main hull, and strap handles assembled, with fins mounted between the hulls

4.4 Optional Sliding Crossbar Assembly and Installation

The Sliding Crossbar enables quick assembly and disassembly of the Riverboat.

1. Mount the crossbar sections to the hulls using the ¼-20 x 5/8" buttonhead cap screws and flat washers.
2. Install the wire rope harness eyebolts through the horizontal holes on the outriggers forward crossbar members. Lock the eyebolts into place with the lock nut (see figure 4.8).

3. Slide the outriggers into the main hull, align the retaining pin holes, install the two cabled retaining pins in the aft holes, and tighten the thumbscrews (see figure 4.10).
4. Install the kick-up fins on the inside of the hulls using the $\frac{1}{4}$ -20 x $\frac{3}{4}$ " button head patch screws with lock washers. When you are ready to put the Riverboat in the water, rotate the fins downward into the desired position and tighten the retaining screws with the provided hex key.
5. If you are using our Soft Case or our ATA case (see figure 4.9), your Riverboat can be stored with your ADCP mounted and your transceiver and battery installed.



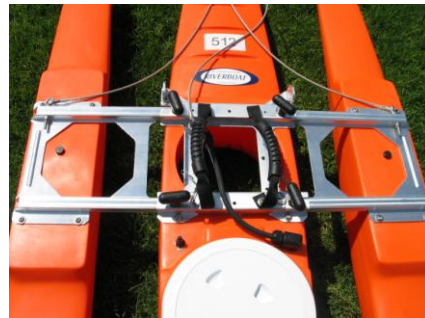
(Fig. 4.8) Wire Rope Harness eyebolt with lock nut installed on outrigger



(Fig. 4.9) Riverboat in storage / transport case



(Fig. 4.10) Insert the outrigger crossbar parts into the main hull, align, install the retaining pins, and tighten the thumb turns



4.5 Optional Rigid Bridle Assembly and Installation

(Can only be used with the Riverboat Sliding Crossbar)

In rare situations, Riverboat users want to deploy their boats very near to a bridge. In these cases, the standard wire rope harness included with your Riverboat tends to pull the bow upwards. The optional rigid bridle provides a fixed attachment point above the boat. The higher attachment point helps keep the bow down and the ADCP in the water.

In higher flows, care must be taken to make sure that the bow is not pushed down too much. This can cause submersion of the boat which increases drag and could cause loss of the boat. The rigid bridle also makes the boat more difficult to turn.

Use of the correct towing angle is critical to performance and equipment safety. Ideally, the tether and rigid bridle are collinear. If the bow still pitches up too much, a very slight negative towing angle on the rigid bridle may be used. Extreme care should be taken as a large negative angle may cause the bow to dive, submerging the Riverboat (see figures 4.11 - 4.13).

For these reasons, we recommend using the rigid bridle only in relatively low flows. Using the rigid bridle in flows greater than 1 m/s is done at the user's risk.

Whenever possible, Oceanscience recommends removal of the rigid bridle and use of the wire rope harness by itself. The rigid bridle detaches easily by removing the shoulder bolts at the base of the uprights (see figure 14). Be sure to secure the retaining pins with their cable leashes with storing the loose parts for the Rigid Bridle (see figures 4.15 and 4.16).



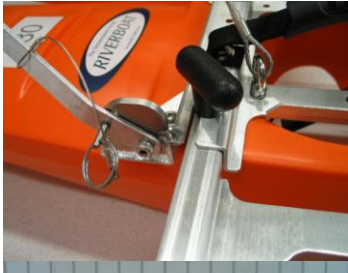
(Fig. 4.11) Preferred towing angle. Tether and bridle are collinear.



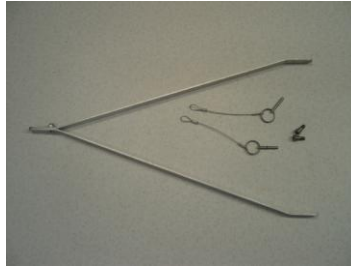
(Fig. 4.12) Positive towing angle. Acceptable



(Fig. 4.13) Negative towing angle. May submerge the boat, causing severe drag and possible loss of the boat



(Fig. 4.14) Rigid Bridge connection detail



(Fig. 4.15) Rigid Bridge loose parts



(Fig. 4.16) Carabiner with wire rope harness and instrument safety cable, attached to the Rigid Bridge

4.6 Optional Oyster PE / Trimble I-GPS / P66 Depth Sounder Assembly and Installation

Required Parts (see figure 4.17)

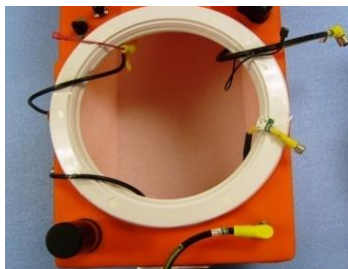
Oyster PE
 Trimble GPS Receiver
 12 Volt 7.2 SLA Battery
 (3) 12 Volt NiMH Battery Packs
 Rectangular Heat Shield
 Oyster PE to Battery-Power Cable
 GPS to Oyster-Data/Power Cable
 ADCP to Oyster-Data Cable
 Depth Sounder to Oyster-Data/Power Cable

**Note: All batteries should be fully charged before beginning this process*

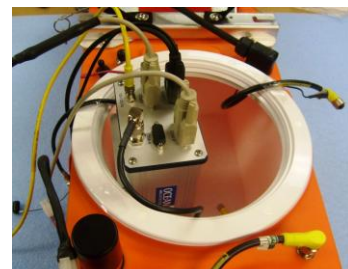
1. To begin, secure the pre-installed Riverboat cables with tape as shown (see figure 4.18).
2. Place the Oyster PE inside the boat with **the heat sink facing the port side** and data ports facing upwards as shown (see figure 4.19).
3. Connect the three labeled DB-9 serial connectors to the matching labeled serial communication ports on the Oyster, allowing the excess cable to fall over the port side of the boat as shown (see figure 4.19).
4. Connect the Antenna RF cable (installed) to the labeled antenna port on the Oyster as shown (see figure 4.19).
5. Connect the Oyster Power Cable (yellow) to the labeled 12 V DC IN port on the Oyster as shown (see figure 4.19).



(Fig. 4.17) Required Parts

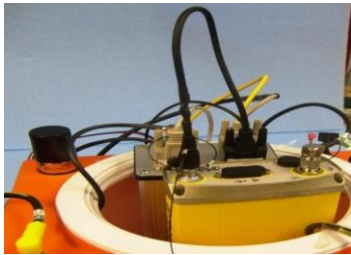


(Fig. 4.18) Pre-installed Cables

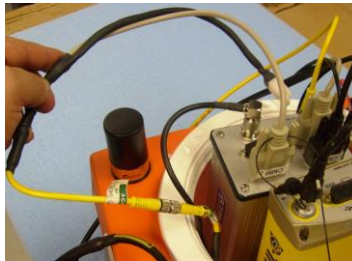


(Fig. 4.19) Connecting the Oyster

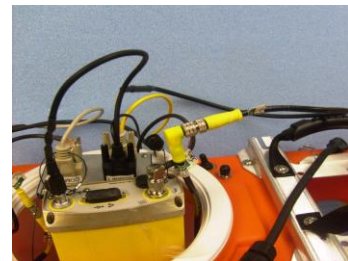
6. Place the Trimble GPS Receiver into the boat with the flat side facing the Oyster. Then connect the (black) LEMO Connector (Comm. 1) into the port on the GPS Receiver. **Note the red dots for alignment** as show (see figure 4.20).
7. Connect the Internal GPS Ant. Cable (installed) to the Port on the GPS Receiver (see figure 4.20).
8. Connect the Depth Sounder Data Cable (Comm. 2 yellow) to the installed Internal Depth Sounder Cable (stern starboard side, yellow) as shown (see figure 4.21).
9. Connect the Oyster to the ADCP Data Cable (Comm. 3) to the Internal ADCP Cable as shown (see figure 4.22).



(Fig. 4.20) Connection the GPS

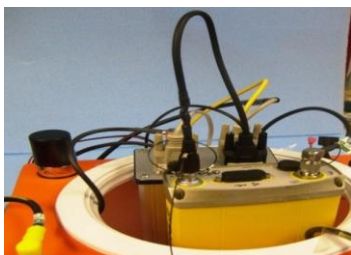


(Fig. 4.21) Connecting the Depth Sounder

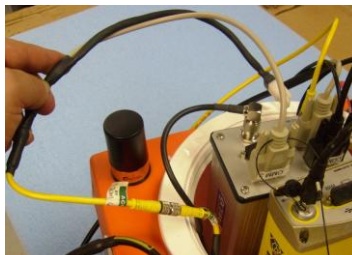


(Fig. 4.22) Connecting the ADCP Cable

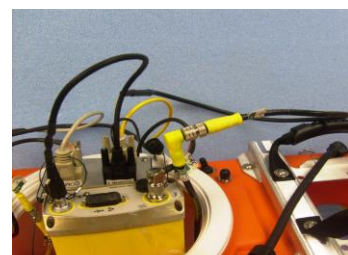
10. Carefully position the Oyster PE and GPS Receiver into the hull cavity; ensure that the three white instrument power leads are still outside of the boat as shown (see figure 4.23).
11. Position the Large 12 volt battery and connect the leads accordingly as shown (see figure 4.24).
12. Position the Rectangular Heat Shield between the GPS Receiver and Oyster as shown (see figure 4.25).



(Fig. 4.23) Position Oyster PE and GPS receiver into hull



(Fig. 4.24) Position and connect 12 volt battery



(Fig. 4.25) Position Heat Shield between GPS and Oyster

13. Position the three 12 volt battery packs with leads forward as shown (see figure 4.26).
14. Connect the instrument power leads to the batteries (no specific order) as shown (see figure 4.27).
15. Position all access wiring in the space provided behind the instruments as shown (see figure 4.28).
16. The white battery connections and ADCP cable should remain above the instruments. All cables and wiring should be positioned away from the Oyster Heat Sink as shown (see figure 4.29).
17. The Oyster PE Heat Sink should always be positioned facing the port side of the hull cavity as shown (see figure 4.29).
18. Place the deck lid on tightly; the Riverboat is now ready for use.

*NOTE: the on/off toggle switch only controls power to the ADCP. To power off the other instruments, disconnect the white battery connections when the Riverboat is not in use.



(Fig. 4.26) Position three 12 volt battery packs



(Fig. 4.27) Connect instrument power leads to the batteries



(Fig. 4.28) Position all access wiring in the space behind the instruments



(Fig. 4.29) Position all cables and wiring away from the Oyster Heat Sink

5.0 Riverboat Carry Case Options

5.1 Soft Carry Case

The Riverboat fits snugly into the Soft Case as shown in these pictures. Note the orientation of the hulls with all bows to the narrow end of the bag (see figure 5.1). Also, the outriggers should be nested inside the rigid bridle flanges as shown inside the Rigid Bridle flange (see figure 35.2). Be mindful of the outrigger positioning so not to disturb antennae (see figure 5.3 and 5.4).



(Fig. 5.1) Bows of all hull at narrow end of Soft Case



(Fig. 5.2) Nest the outriggers inside the Rigid Bridle flanges



(Fig. 5.3) Correct arrangement of the hulls inside the Soft Case



(Fig. 5.4) Riverboat with Sliding Crossbar stowed in the Soft Case

5.2 ATA Hard Carry Case

The Riverboat fits snugly into the ATA Case as shown in these pictures. Note the orientation of the hulls with all bows to the one end of the case (see figure 5.5). Also, the outriggers should be nested inside the rigid bridle flanges as shown inside the Rigid Bridle flange (see figure 5.6). Be mindful of the outrigger positioning so not to disturb antennae (see figure 5.7 and 5.8).



(Fig. 5.5) Bows of all hull at one end of ATA Style Case



(Fig. 5.6) Nest the outriggers inside the Rigid Bridle flanges



(Fig. 5.7) Correct arrangement of the hulls inside the ATA Case



(Fig. 5.8) Riverboat with Sliding Crossbar stowed in the ATA Case



6.0 Riverboat Warranty

The Oceanscience Group, Ltd makes every effort to assure that its products meet the highest quality, reliability and durability standards and warrants to the original purchaser or original purchasing agency that each Riverboat be free from defects in materials or workmanship for a period of one year from date of shipment.

Polyethylene Riverboat hulls are warranted free from manufacturing defects for three years from date of shipment.

Warranty does not apply to defects due directly or indirectly to misuse, negligence or accidents, repairs or alterations outside of our facilities, use of the Riverboat for purposes other than river discharge measurements, or use with instruments weighing more than 25 lbs.

Oceanscience is not responsible for loss of boat, instruments, damage to property, injury or death associate with the use of any of its products or products that may be included or used with Oceanscience products.

Oceanscience does not warrant third party products sold by Oceanscience. These may include GPS, depth sounders and other ancillary equipment.

All warranty services are FOB Oceanscience's facility in Oceanside, CA.

7.0 Addendum

7.1 Sentinel ADCP Mounting Bracket Assembly Instructions

1. Position the Sentinel ADCP mounting bracket over the four holes of the crossbar as shown (see figure 7.1).
2. Using the strap handle hardware bag 6100026, place the strap handle grommets over the sentinel mount feet. Then place a $\frac{1}{4}$ " flat washer over the grommet, and attach with the $1\frac{1}{4}$ " button head screws as shown (see figure 7.2).



(Fig. 7.1) Position mounting bracket over the four holes of the crossbar



(Fig. 7.2) Place strap handle grommets over mount feet and attach