P-Series CRRCs

P4.2 / P4.7 / P5.3 / P5.8

OPERATOR MANUAL

Designed Smarter, Built Tougher.

Wing Inflatables, Inc.
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MISSION CAPABLE

(Come Hell or High Water)

The Wing P4.2, P4.7, P5.3 and P5.8 CRRCs are the ideal inflatable boats for missions in which rapid deployment, high performance, and reliability are key assets for success. Whether paddled for stealth or powered for speed, Wing's CRRCs are designed for a variety of military, law enforcement and scientific missions – from combat reconnaissance to search and seizure; from boarding operations to search and rescue; from insertion and extraction of Special Forces teams to maritime patrol, from oceanic atmospheric research to ecosystem protection . Whatever your need, we've got you covered.

Contents

In the Best of Company

As an operator of the Wing P4.2, P4.7, P5.3 and P5.8 CRRCs you can be proud. You're in the best of company, because the craft beneath you is the finest of its kind. Wing CRRCs use the latest and best technologies available for manufacturing rugged and durable inflatable boats. The boat(s) you've purchased were designed and built in the United States. Built by highly dedicated professionals who care deeply about boating, about safety, and about the people who put their lives on the line every day to serve their country. That's why we set out to give you stronger, lighter, more maneuverable crafts – crafts that will perform better and last longer than any other CRRCs in the market.

Attention Experts and Old Hands

We know your ranks are filled with experts and seasoned operators. They know how to drive a CRRC. They understand what works and what doesn't. They will quickly come to appreciate the benefits of a Wing CRRC. Rather than getting the "same old, same old," your trained operators will be handed something different: a CRRC that can handle any challenging mission it's asked to perform!

So how are the Wing CRRCs different? To start with, we use better materials. Our heavyweight polyester fabric is coated with Polyurethane. This means our boats are stronger and more durable than other options out there. Repair and maintenance are also easier and faster than models made from hypalon (CSM) or other materials. Our floorboards and transoms are made from high density, fiberglass-reinforced Polyurethane, with fiberglass-reinforced plastic (FRP) layers on each side. This means our transoms and floorboards are strong, flexible, and impervious to rot or decay – lighter and stronger than either wood or aluminum.

We're also different because we have a unique design. Each Wing CRRC features a balance of design characteristics. This design balance means the Wing CRRCs are versatile, allowing them to perform well in various sea conditions. They feature comparatively high deadrise angles, for better performance and a more stable ride in rough, choppy seas. At the same time, our main buoyancy tubes are designed for stability— forming downturned chines— to allow for a quick jump onto plane and a smooth ride at lower speeds in calm water. Moreover, the square-bow design and broader beam translate into more interior space – which means more room for gear and a more comfortable ride. Better performance and more room – we think you'll agree that these features will be tremendous assets to help you accomplish whatever mission you're assigned to perform!

Lastly, we're different because Wing CRRCs are made right here in the USA. That's right. American made. We're Berry Amendment compliant. That means all the fabric, rope, cords, and other components covered under the Berry Amendment are of US origin. So we buy from suppliers who also make their products in the United States. Proudly made in the USA by people who truly care!

Everything you need to know is right here in this manual. Assembly. Operation. Maintenance. Repair. Please read this manual and then take your new Wing CRRC(s) out for a test drive. We're confident you'll see why we're so proud of our boats and how well they'll perform for you when you're out there putting your life on the line in service to our country!

“Run Hard, Run Fast—Save Some Lives. Kick Some Ass.”

— Bill Wing, Founder

About Wing Inflatables

Who We Are

Wing Inflatables is an all-US owned and operated company based in Northern California. We design and produce inflatable products out of extremely durable, US made Polyurethane-coated nylon and polyester fabrics, using thermo- and radio frequency welding techniques. We do this with assistance from proprietary CAD software written exclusively for our fabric’s unique and superior characteristics.

Our product range includes inflatable boats, rafts, pontoons, fuel bladders, engine bags, foam collars, and air-holding tubes for RIBS.

This line of inflatable products is managed by a cadre of dedicated engineers, designers, and craftsmen. We can build to any specification while exceeding any expectation—for quality workmanship, product performance, and enthusiastic customer support. This is our commitment and our guarantee.

What We Are About

As the largest US owned and operated supplier of inflatable tubes, sponsons, and foam-filled collars for RIBs in service with the United States military, we know what floats your boat. We’ve got your back. We build each tube and inflatable boat with the same attributes found in our military, law enforcement and research professionals: strength, reliability, durability, and unwavering commitment.

Our Mission

Our mission is to enable our nation’s military, law enforcement, first-responders and scientific researchers to perform difficult and demanding operations with confidence and safety, by employing the finest inflatable boat in the world.

WING CRRCS – TOP OF THEIR CLASS

Seven Key Reasons to Run One

#1 Polyurethane vs. hypalon. A polyester scrim coated with Polyurethane not only gives the Wing CRRC superior tear, puncture, and abrasion resistance compared to hypalon (CSM) and PVC, the 1680 denier thread count adds stiffness as well. Consequently, an inflated Wing is more rigid yet lighter than boats made with lesser materials. A lighter, more rigid boat is a faster, more maneuverable, more efficient boat to run.

#2 Thermo-welded vs. glued seams. Thermo-welding bonds two pieces of coated fabric together as if they were one. Molecularly fused using heat (not adhesives as with hypalon), welded seams are far more reliable than glued seams. Expect a greatly extended service life and a much longer shelf life for boats in long-term storage with welded seams over glued seams.

#3 FRP Composite transom and floorboards vs. plywood/ aluminum. FRP composite is nonabsorbent so it won't rot or decay. It is lighter than wood or aluminum and has a superior strength to weight ratio.

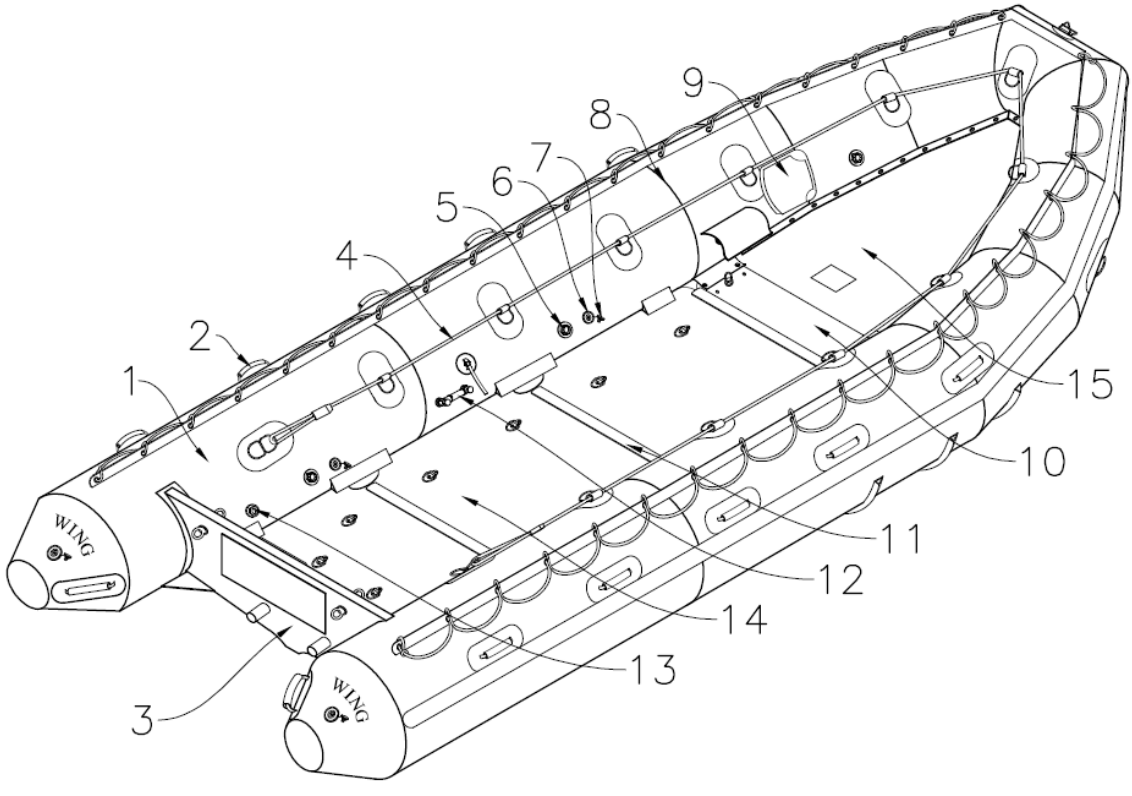
#4 Tapered tube bow. Our tapered side tubes and squared-off bow creates 20% more usable hard-deck space in the bow. On the outside, the squared-off bow directs air down into the V-hull assisting with lift and planing.

#5 Wing's "V-Hull" design vs. lower buoyancy tubes (LBTs). With or without a load, the Wing CRRCs get up on a plane fast—faster than the LBT-equipped competition. Eliminating these unnecessary LBT's results in: less weight, less draft, less drag, a reduced wake profile, and less stuff to go wrong. The four-inch deadrise from our main buoyancy tubes (MBT) to the fabric floor creates a tunnel effect that assists in lift at higher speeds.

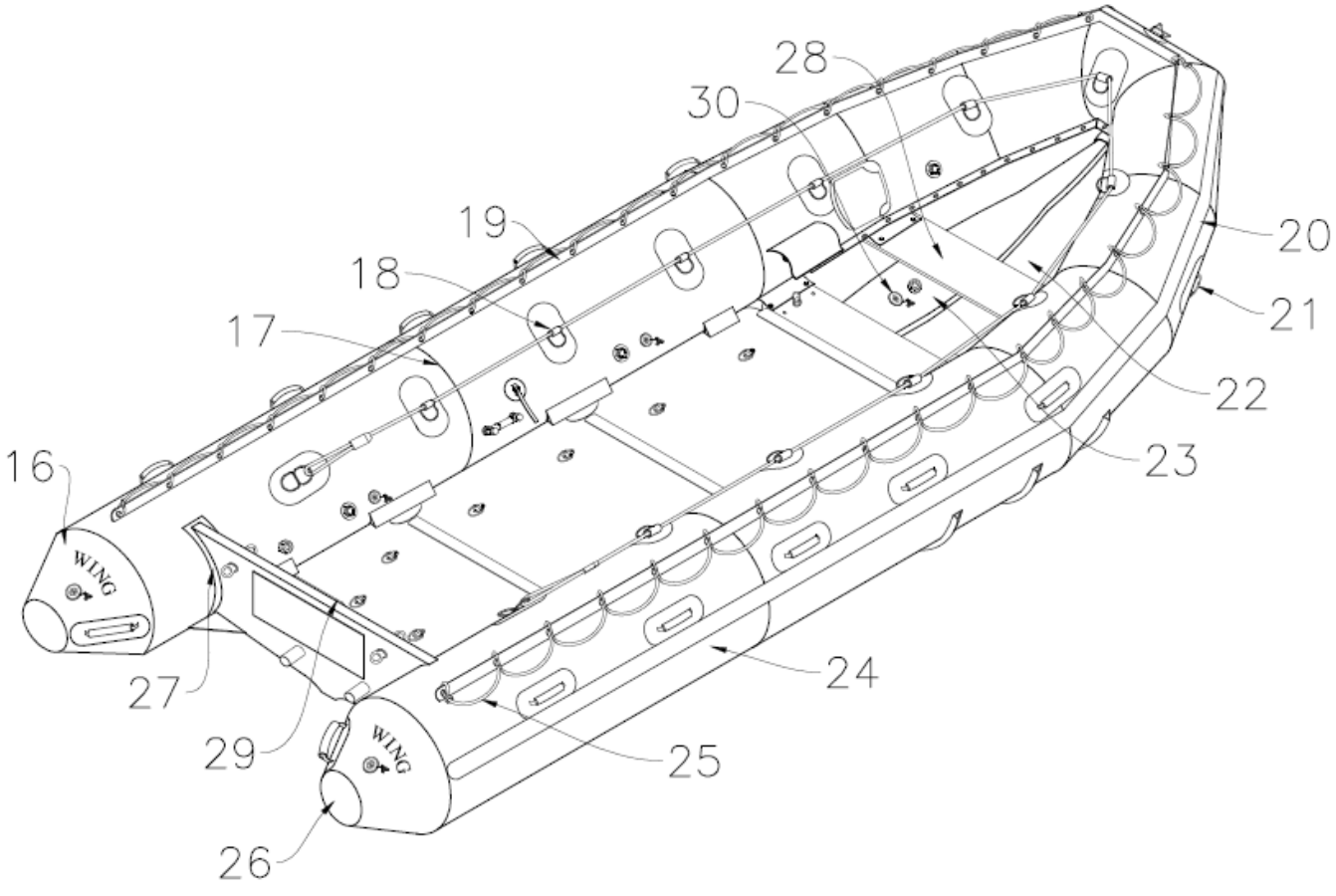
#6 Dimensionally the same as current in-service CRRC models. For all the increased performance, the Wing CRRCs are identical bow to stern, and port beam to starboard, as the current in-service CRRCs. Our basic models weigh less as well, so it will easily match, fit, lift, install, launch, trailer, or stow for any mission, anywhere.

#7 Berry Amendment compliant. The Wing CRRCs are proudly made in the USA by skilled workers who care deeply and passionately about the quality and performance of this unique craft as well as the special people who are called upon to operate it during their missions.

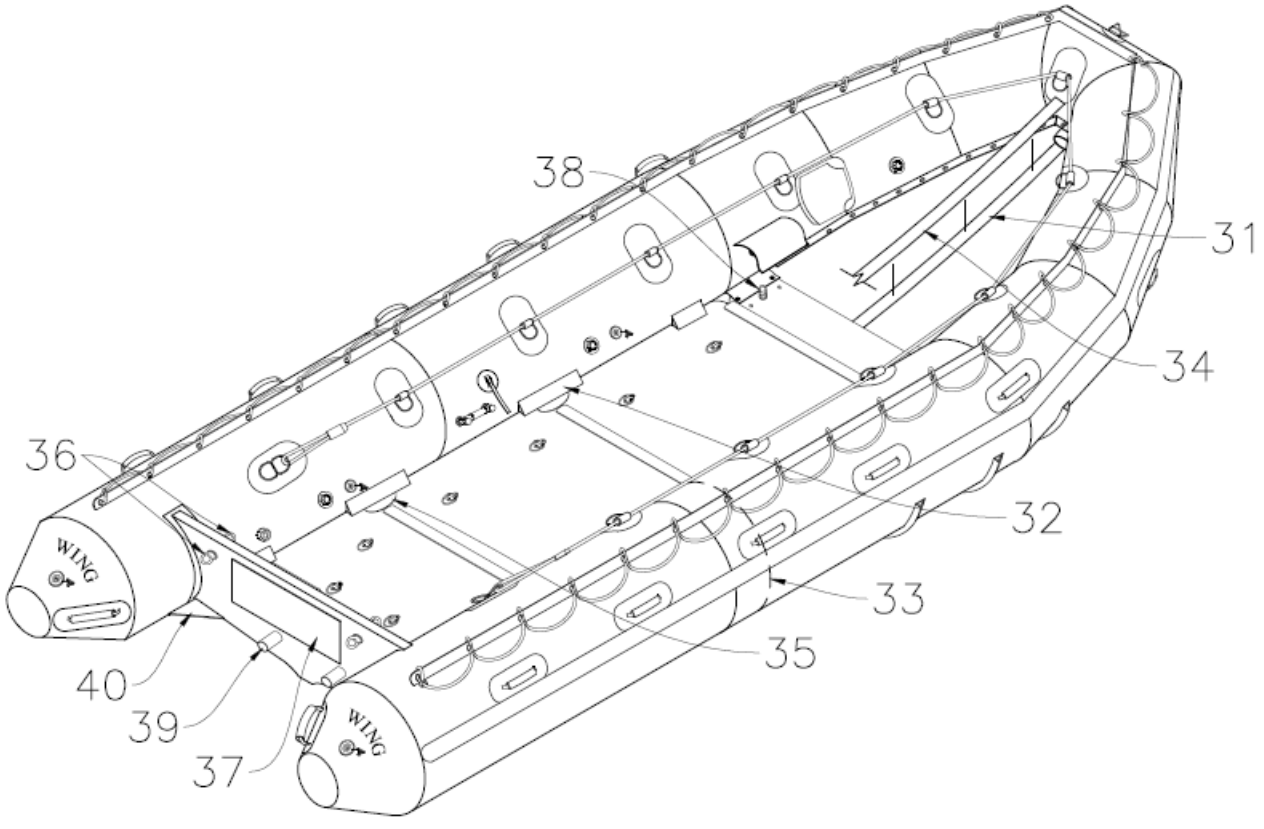
General CRRC Parts Diagram



1. **Main Buoyancy Tube (MBT)** – Primary inflatable structure of CRRC
2. **Lifting Handle** – Heavy duty handle placed on the outside of the MBT to enable the craft to be carried
3. **Transom** – Composite Structural beam at the stern on which an engine can be mounted
4. **Inboard Lifeline** – Line attached inboard on MBT
5. **PRV** – Pressure release valve
6. **Fill Valve** – Manual inflation valve
7. **Fill Valve Cap** – Protective cover for fill valve/redundant air seal
8. **Seam Tape** – 1" of Polyurethane material laid over welded seams
9. **Paddle Holders** – Secure paddles to MBT (certain models)
10. **Main Thrust-board** – FRP composite board near bow affords longitudinal support and provides attachment and hoisting platform.
11. **Floorboard Joiner** – Aluminum extrusion mating two floorboards together
12. **Air Chamber Crossover Valve For Single Point Inflation** – Bypasses MBT baffle
13. **Auto-Inflation Port** – Valve where hose from inflation cylinder plugs into tube
14. **Composite Hard Deck Floorboard** – Creates hard deck surface (Number of floorboards depends on CRRC)
15. **Bow Skirt** – Protective laced in cover



16. **Cone** – Stern end of MBT
17. **Thermo Welded Seam** – Two pieces of fabric Polyurethane fabric permanently fused using heat or RF welding
18. **Rope Ring/D-ring combo**
19. **Grommet Strip –** Strip of grommets along top of MBT
20. **Rubstrake/Marley** – Reinforcement material in high-wear area along the MBT
21. **Heavy duty D-rings** – Attachment points for mooring or towing
22. **Sheet Floor** – Polyurethane coated polyester forming CRRC hull
23. **Keel** – Inflatable tube running fore and aft giving form to fabric hull
24. **Bottom Chafe** – Extra layer of Polyurethane material in high-wear areas
25. **Outboard Lifeline –** Line attached outboard on MBT
26. **Rubstrake/Marley cone end** – Reinforced Marley abrasion material in high-wear area
27. **Oval Transom Chafe** – Fabric reinforcement for strength and stress-mitigation
28. **Forward Thrustboard** – FRP composite board forward of Main thrustboard affording additional longitudinal support
29. **Transom Motor Mount Plate** – Metal plate attached to transom
30. **Keel Fill Valve** – Manual inflation valve



31. **Floor Velcro strip** – Attached to floor to mate with Keel Velcro strip
32. **Floorboard Cleat** – Retainer to prevent floorboard lift
33. **Bulkhead/Baffle** – Fabric wall creating separate chambers in MBT
34. **Keel Velcro strip** – Attached to keel for proper alignment of keel to floor
35. **Gusset Joiner** – Crescent shaped aluminum, mating two boards, along with main Joiner, for stiffening floorboard assembly. Used for heavy load operations.
36. **Towing/Lifting Eye** – Dual-sided steel eye for towing and lifting
37. **Sacrificial Plate** – Attached to rear of transom
38. **Bow Lifting Eye** – Attached port and starboard side of main thrustboard
39. **Scupper Drain** – Allows water passage from inside to outside of CRRC
40. **Transom Spray Deflector** – Outboard of transom to minimize splash

Inflation Specifications

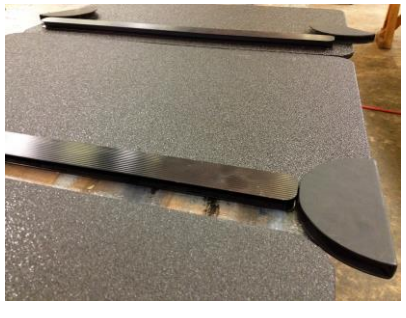
The Wing CRRC Main Buoyancy Tube is rated for normal operating pressure of 4.4 psi with ability to run up to 5.0 psi with heavier loads. Each chamber is equipped with a Pressure Relief Valve (PRV) to ensure over-inflation does not occur. However, over-inflation can occur if the PRV fails or is intentionally blocked. Use the supplied pressure gauge to ensure each air chamber is properly inflated. Operating the boat below the designed working pressure of 4.4 psi or above the PRV reseat pressure of 5.0 psi can cause performance issues and may damage the boat or pose a safety risk to passengers. To avoid risk, always operate the boat with the MBT in the normal operating pressure range.

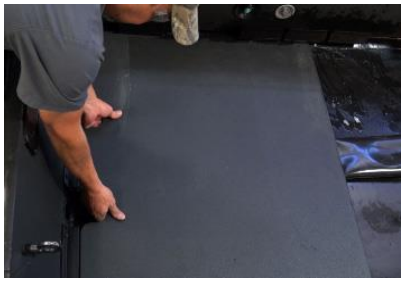
Minimum inflation pressure:

Main Buoyancy Tubes	4.4 psi (303 mbar)
Keel	4.4 psi (303 mbar)

CAUTION: DO NOT UNDER-INFLATE!

Assembly and Disassembly – Hard Deck





Floorboard and Thrustboard Installation

1. **Unpack the boat.**
Roll it out on a clean, flat surface.

2. **Remove and inventory components.**
A first "dry-run" assembly, with all parts in order, will quickly familiarize you with your parts and greatly facilitate placing the items into your CRRC. Remove floorboards (main floorboards; optional bow boards if ordered , step #11), thrustboard (s), joiners, joiner gussets, and all hardware from the box. Lay out, alongside the boat, all floorboards and assembly parts on a tarp or clean flat surface next to the boat, in the proper order. Ref Drawings on page 8, 9, 10 &11.

3. **Open cross-over valves and partially inflate the boat from the stern.**
Partially inflate both sides of the boat, until the tube takes shape, but no more than approximately 50%.

4. **Ensure that the keel is properly positioned.**
With the keel uninflated, center the keel Velcro with the floor Velcro, and that the keel is fully inserted into the ends of the stern and bow keel pockets, and that the keel retaining straps are loosely tightened around the keel. It's important not to constrict the keel with the lacing straps, once inflated. If in doubt, inflate the keel to verify position and tightness of straps, then deflate the keel before the floorboard installation.

5. **Insert <u>aft</u> floorboard section into transom batten.**
Slide the aft floorboard (with cut outs placed facing transom) under the rear floor cleats and into the floor battens on the transom. Press down on the floor (either with your hands or by standing on the board) to ensure the floorboard is underneath the floor retention cleats (Under the two aft 6" cleats and

halfway under the two 18″ cleats at the forward edge). Ensure that the floorboard is pressed all the way to the transom and sits snuggly in the battens.

- *Wing Tip: Spraying the groove between MBT, cleats, boat bottom, and along the surface of the keel, with soapy water (from a spray bottle or damp rag not provided) reduces friction and allows for easier installation of floorboards.*
- *Wing Tip: Sit inside the boat and evenly press the board with your feet towards the transom.*
- *Wing Tip: Have a partner(s) help pull the partially inflated MBTs slightly outward to help with floorboard install. If you are installing the deck alone, pushing against the MBT on one side with your back and the opposite side with your feet can also help.*

6. **Install aluminum gusset joiners.**
Attach aluminum joiner gussets to both sides of floorboard, pressed tight against each edge of the board, straight section outboard/curved inboard. *Wing Tip: if the fit is overly tight between the joiner gussets and the board, it can be easier to install the gussets to the board prior to installing the board into the boat.*

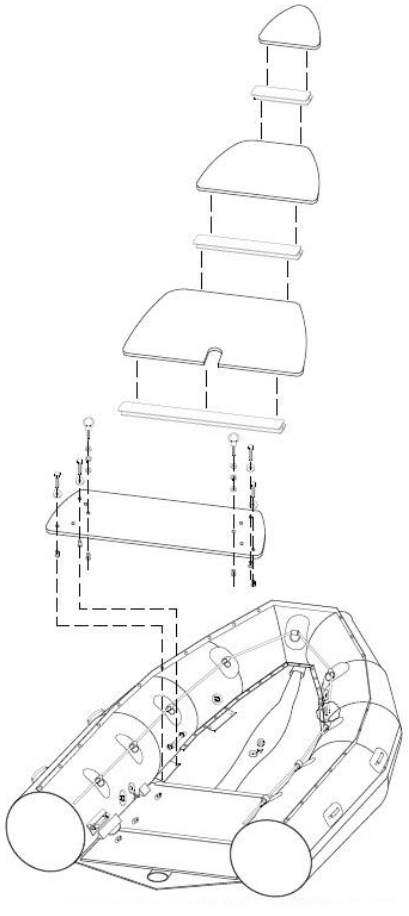
7. **Install aluminum joiner.**
Center and attach one long aluminum joiner (P5.3 & P5.8 have wider joiners) to the leading edge of the aft floorboard.

8. **Install 2nd floorboard.**
Using a similar technique as in Step 5, slide the next floorboard section into position, making sure it fits under the floor retention cleats, and is firmly seated in the joiner. *Wing Tip: ensure that each main board slides all the way to the rear, and the gaps between boards-joiners-gussets are reduced as much as possible to minimize "stacking" errors (i.e. cumulative gaps) in the final assembly. To aid with this, webbing or cord can be used to pull the floorboard rearward, using the pad eyes on the floorboards.*

9. **Repeat steps 5 through 7 for main floorboards 3 and 4 up to thrustboard.**
Joiner gussets are <u>not</u> used between the fourth main floorboard and the thrustboard.

10. **Slide the thrustboard into place.**
Insert thrustboard (longest length aft) into the most forward main floorboard joiner as shown, and pull rearwards into the joiner. Align the outboard attachment holes in the thrustboard with holes in the fabric attachment flap. Do not yet install the bolts through the thrustboard flaps. The thrustboard bolts will be attached later (Step 15) after the entire floorboard system is installed and the MBT's and keel are inflated. For now, simply ensure that the holes for the hardware in the thrustboard approximately line up with those in the thrustboard flap.

11. **Install the forward bow board and joiner (model specific).**
If your CRRC was purchased with a forward bow section or if you ordered as a separate the forward bow section as a separate accessory item, center and snuggly seat the smallest joiner onto the widest edge of the forward bow board, and place the combination forward into the boat.



12. **Install the second (middle) bow board and joiner.**
Center and snuggly seat the 2nd smallest joiner onto the widest edge of the second bow board, center the board relative to bow board one, and press the combination forward into the bow board one joiner.

13. **Install the third bow board and joiner.**
Center and snuggly seat the appropriate joiner onto the widest edge of the third bow board (board with cutout for fill valves), and place the combination forward into bow board two. Verify that the position of the keel fill valves fits in the cutout of bow board three. Reposition as necessary.

14. **Final install of bow boards to thrustboard.**
Ensure all air is out of the keel. Ensure the main floorboard and thrustboard assembly is pressed all the way to the stern, and minimal gaps between boards, joiner and joiner gussets. Verify the forward bow board assembly (3 boards, 3 joiners) is centered and pressed forward. While kneeling to the rear of the thrustboard, use the Floorboard Pry Levers (P5.8 CRRC only). The bow board assembly and the rear joiner of bow board three should be resting on the thrustboard. Slide the Pry Levers under the aluminum joiner (Pry Lever handle to the stern) and slowly lift up and lever the handles towards the bow. *Wing Tip: As this motion takes place, it helps to have a partner gently step/press down on bow three board and slightly lift the forward edge of the thrustboard.*
Caution: Excessive force should not be required if proper technique is used. Be careful with over torqueing the edges of the levers against the floorboard edges. Included in the install kit are Pry Plates to protect the edges of the floorboards, if needed.

15. **Install Hardware (4 bolts & washers).**
Place washer on top of attachment flap hole and insert threaded bolt into thrustboard hole. Hand tighten only.

Inflating the Boat

1. **Open all cross-over valves,** making sure that the "pin" sets into the notch.

2. **Insert inflation hose.** Insert the inflation hose fitting into valve stem in stern chamber (either port or starboard).

3. **Fully inflate the MBT chambers until PRVs release and reseat.**

4. **Inflate keel to 4.4 psi.** When the MBT has been fully inflated, if the auto inflation hose is connected to the keel, it too will inflate to the MBT pressure. The keel will be the last to inflate, so it may need a few extra seconds to match the pressure of the MBT. ***KEEL DOES NOT HAVE A PRV***. *If you independently inflate the keel and do not use the auto fill hose, be careful not to overinflate the keel.*

5. **Tighten Thrustboard bolts.** Using ½" wrench or crescent wrench, tighten bolts firmly. Be careful not to over tighten.

6. **Close all cross-over valves and keel inflation hose valve.**

Hard Deck Disassembly

1. **Deflate keel.**
Deflate keel by removing inflate/deflate valve cap, depress yellow valve stem to deflate (depress yellow valve stem and rotate clockwise to lock the valve in the open position, depress and rotate valve stem back again to close). Push on keel until air is evacuated.

2. **Partially deflate one side of MBT.**
Deflate one side of MBT to approximately 50% by removing inflate/deflate valve cap, depress the yellow valve stem to deflate. Depress the yellow valve stem and rotate clockwise to lock the valve in the open position, depress and rotate valve stem back again to close. Release more air if necessary.

3. **Fully deflate opposite side.**
Deflate other side of MBT to the point where most of the air has been released (same process as Step 2).

4. **Remove thrustboard.**
Remove thrustboard by unscrewing attachment bolts. Use ½" wrench. Unscrew the 4 bolts attaching the thrustboard to the thrustboard attachment flaps (2 per side), lift thrustboard flap, and reinsert bolts and washers into the threaded inserts.

5. **Remove forward joiner and floorboard sections.**
Remove forward joiner and floorboard section. Repeat process until all floorboards are removed. Make sure all parts, tools and hardware are accounted for.

6. **Deflate boat completely.**
Deflate boat completely. Using a Shop Vac (if available) speeds up this process.

Assembling the Roll-up Floor

The Wing P-Series crafts (P4.2, P4.7 & P5.3) come with optional slatted roll-up floors. The aft end of the floor is secured at the transom by a grommet and lace system. The front end is secured at the main thrustboard by means of a threaded bolt and washer. A forward thrustboard is installed for additional bow support. A bow skirt is provided to cover the bow area. The bow skirt is secured to the main thrustboard and to a grommet and lace system in the bow.

1. **Open crossover valves and partially inflate boat from the stern.**
Partially inflate both sides of the boat, until the tubes take shape (no more than 50%).

2. **Insert main and forward thrustboards.**
The forward thrustboard and hardware comes only in the roll-up floor kit. If you are installing the hardware for the first time, the hardware installation will take place after inflating the MBT.

Note: In using the Wing Roll-up floor system, the three bow boards of the hard deck assembly (certain models only) are typically not used, but may be if desired, and replace the forward thrustboard.

3. **Spread tubes.**
Have your partner pull the partially inflated tubes out to expose the floor retention cleats.

4. **Insert floor.**
With a partner, lift the roll-up floor and place it into the boat. Make sure the floor is oriented correctly – aft end has the grommet strip and inflation cylinder attachment system.
Wing Tip: Spraying soapy water along the groove between tube and boat bottom, along the underside surface of the roll deck and on the top of the keel, reduces friction and allows for easier installation of floorboards. An alternate method is to use cloth soaked in soapy water solution.
Wing Tip: Have a partner(s) help pull the partially inflated MBTs slightly outward to help with floorboard install. If you are installing the deck alone, pushing against the MBT on one side with your back and the opposite side with your feet can also help.

5. **Position roll-up floor.**
Pull roll-up floor aft until it is seated firmly in the stern. Ensure floor is positioned under all of the floor retention cleats.

6. **Attach floor to transom.**
Align grommets with holes in transom batten. Attach floor to transom batten by lacing it through the holes. Tie a knot to complete the process. Tie a knot, such as a bowline, to complete the process.

7. **Insert inflation hose and inflate using "Inflating the Boat" steps.**
Insert the inflation hose fitting into the valve stem in stern chambers.

8. **Attach floor to main thrustboard.**
Align attachment holes in attachment flap with corresponding holes on the thrustboard. Place washer over attachment hole and insert bolt into threaded hole on the thrustboard. Hand tighten bolt. Using ½" wrench, tighten bolt. Avoid over-tightening. Repeat process with the other side. The main fabric floor attaches using the two aft inboard bolts of the main thrustboard. The bow fabric floor attaches to the two forward inboard bolts

9. **Attach bow skirt.**
Place washer over attachment holes and insert bolt into threaded hole on the thrustboard. Hand tighten bolt. Using ½" wrench, tighten bolt. Align holes in bow, lace through the holes. There are several ways to lace the floor down, with the simplest being to run the lacing through alternately over the top, underneath, then back up over the top, etc. Tie a knot to complete the process.

Auto-Inflating the Boat

The Wing P-Series Auto-Inflation models use a unique cross-over valve system that allows the boat to be inflated with compressed air or CO2 via two inflation valves located in the stern of the boat, port and starboard. The cross-over valves allow air or CO2 to flow from one chamber to the next until the boat is fully inflated. Each cross-over valve can then be closed, isolating each chamber and therefore minimizing loss of pressure should an individual chamber become compromised.

1. **Attach inflation cylinder.**
Attach the inflation cylinder to the floor by placing it in the fabric cradle and tightening the straps around the tank.

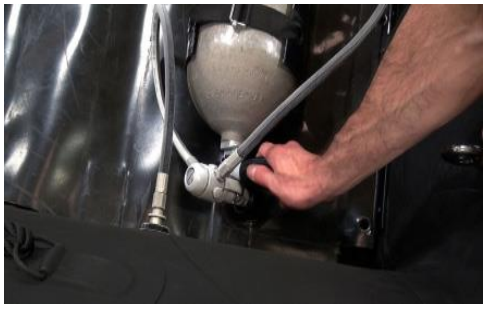
2. **Attach Regulator.**
Attach the regulator assembly with inflation hoses to the inflation cylinder.

3. **Insert inflation hose fittings.**
Insert inflation hose quick disconnect fittings into inflation valves on each side of the boat.

4. **Install the Auto-inflate keel hose.**
Connect to the keel hose to the auto-inflate port on the keel in the bow. Hard deck model in the floorboard cut out. Roll-Up floor model under the skirt flap. Then attach the other end to the MBT fill port on the starboard side of the MBT. Open the keel hose valve by turning the T-valve in line with the hose.

5. **Open cross-over valves.**
Open each cross-over valve by pulling and turning the knob clockwise ¼ turn. "Ensure knob remains in the open (out) position". This is done by "setting" the pin into the notch.

6. **Inflate.**
Begin inflation by **gradually** turning the regulator valve until approximately one turn is reached. The boat will inflate rapidly, as the MBTs progressively fill from stern to bow, with the keel filling last. Continue inflation until the first PRV releases. Turn the regulator valve to the off position. Allow the boat to equilibrate to not waste air from the tank. Then, open the regulator valve again.



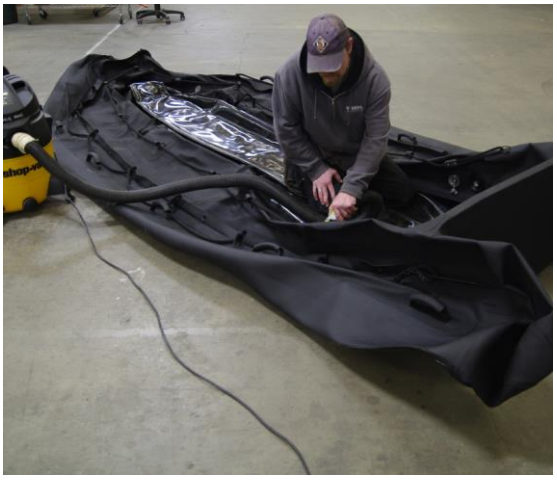
7. **Begin to close regulator valve.**
Gradually begin to close the regulator valve when all the PRVs begin to release air. When this happens, close the valve completely.

8. **Check MBT and Keel pressure** to ensure they are at the minimum operating pressure of 4.4 psi, adjust if necessary.

9. **Close cross-over valves.**

10. **Close and disconnect (operator's choice) the keel hose valve** at both the keel and MBT.

Prepare CRRC for Storage and Transport

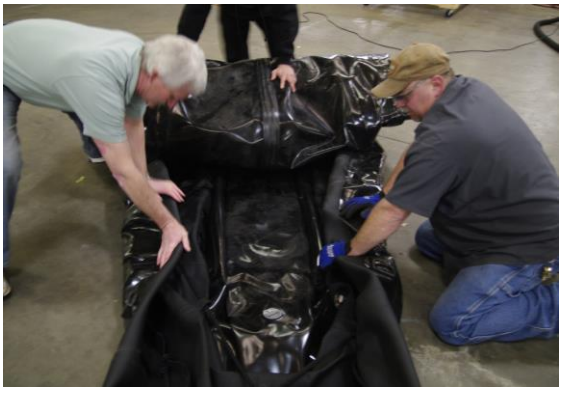


It is necessary to deflate the CRRC completely when preparing it to be rolled up for storage or transportation in the supplied carrying bag. If deflating the CRRC for long term storage, make sure to clean the CRRC using soapy water. Rinse well with clean water and let dry prior to deflation.

1. **Remove hard deck and main thrustboard.**
Set hard deck panels, joiners, gussets, thrustboard and hardware aside. If roll-up floor, remove inflation cylinder and set aside. The roll-up floor, bow skirt, main and forward thrustboards can all stay in the boat.

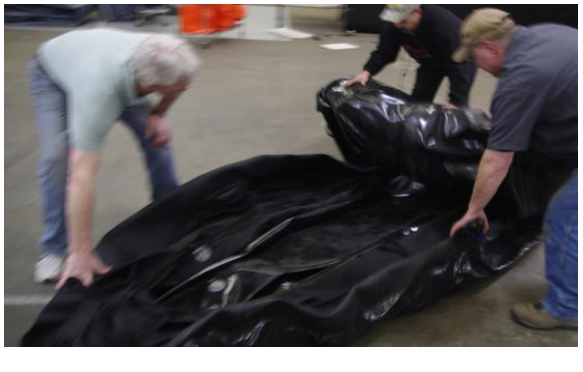
2. **Open inflation valves.**
Unscrew inflation valve covers and turn valve stems until they are locked in the open position.

3. **Open inflation valves.**
Put pressure on the MBT to force air out the valves. Continue putting pressure on each chamber of the MBT until all air has been evacuated. A Shop-Vac can be used to speed up the process.



4. **Unlock valve stems and replace valve covers.**

5. **Pull MBT up and into the center of the boat.**
Fold the transom forward, into the boat.



6. **Roll the boat transom toward the bow.**

7. **Roll the boat into a tight bundle.**
Place boat into its storage carrying case and secure the straps.

Inflation Specifications

The Wing CRRC Main Buoyancy Tube is rated for normal operating pressure of 4.4 psi with ability to run up to 5.0 psi with heavier loads. Each chamber is equipped with a Pressure Relief Valve (PRV) to ensure over-inflation does not occur. However, over-inflation can occur if the PRV fails or is intentionally blocked. Use the supplied pressure gauge to ensure each air chamber is properly inflated. Operating the boat below the designed working pressure of 4.4 psi can cause performance issues and may damage the boat or pose a safety risk to operators. To avoid risk, always operate the boat with the MBT and keel in the normal operating pressure range.

Minimum inflation pressure:

Main Buoyancy Tubes	4.4 psi (303 mbar)
Keel	4.4 psi (303 mbar)

CAUTION: DO NOT OVER-INFLATE!

WARNING: DO NOT UNDER-INFLATE MAIN BUOYANCY TUBE.

Proper inflation of MBT is critical for optimum boat performance.

Under-inflation can result in excessive tube flex, causing fabric stress and a shortened service life. Always inflate to 4.4 psi or until PRVs release.

WARNING:

While inflating, do not leave inflation devices unattended! Pressure Release Valves (PRVs) may not purge fast enough to prevent over-inflation. Over-inflation can cause tube rupture or catastrophic valve failure, resulting in property damage, serious injury, and even death.

Pressure Relief Valves (PRVs)

PRVs are calibrated to release air at 4.7 – 5.0 psi and reseat at 4.4 psi.

While the main buoyancy tubes are rated at a recommended normal operating pressure, 4.4 psi (303 mbar), the inflation limits of Polyurethane-coated polyester far exceed these recommendations.

Approaching these limits, catastrophic valve failure may occur before material failure resulting in flying metal pieces in the vicinity of the boat.

WARNING:

Some PRVs have an override pin. Modification of a PRV is not recommended. Over-inflation can cause tube rupture or catastrophic valve failure, resulting in property damage, serious injury, and even death.

WARNING:

DO NOT OVER-INFLATE THE KEEL!

The keel does not have a dedicated PRV. When properly connected to the bow MBT via the keel hose (with valve open) it will have the same operational pressure (4.4 psi) as the MBT.

Warm Weather Inflation Pressure

There is a direct correlation between air temperature and MBT pressure.

- MBT pressure increases by about 0.05 psi for every 2°F increase in temperature (3 mbar per 1°C).
- It is normal for MBT to gain air pressure on a hot sunny day. The PRVs will release pressure until correct psi is achieved.
- As a result MBT may appear to be partially deflated the following morning or as temperature drops.

CAUTION: Check pressure on morning after warm weather. Always re-inflate MBT and monitor the pressure to confirm the section is not losing air due to valve leak or damage.

Inflation Pressure Maintenance

- MBT and keel should be inflated and pressure verified when the ambient air temperature is between 65°F and 75°F (18°C and 24°C).
- The PRVs will begin to regulate pressure at approximately 4.7- 5.0 psi (323-337 mbar) and reseat at 4.4 psi (303 mbar).

Outboard Engine Installation

Long shaft outboard engines should be installed and operated per engine manufacturer's recommendation to ensure safe operation. Installing an outboard engine requires centering the engine over the transom mounting plate, positioning the two turnbuckle fasteners against the metal engine mount plate. Then tighten the turnbuckle fasteners. Recheck these fasteners for tightness after the 10 minutes of operation and every hour thereafter, and after transport of the outboard engine.

Operational Tips on Boat Handling

Wave & Wake Jumping

Operating the Wing CRRC over waves and/or wakes is a natural part of boat operations. However, when this activity is done with sufficient speed to force the hull partially or completely out of the water, certain hazards arise, particularly when the CRRC re-enters the water. In this instance, because of the rigidity of the urethane-coated polyester fabric, the Wing P4.2, P4.7, P5.3 and P5.8 CRRCs may behave more like a rigid hull boat than a fully inflatable boat. In other words, there is less flex and less play in the interfaces of the Wing CRRCs— hence, less "give" in the MBT and keel. The response of the CRRC can be sudden and swift.

Of primary concern is the craft changing direction while in the midst of the jump. In such a case the landing may cause the CRRC to veer violently in a new direction. A sharp sudden change in direction can cause occupants to be thrown out of position, or out of the CRRC.

Avoid serious injury from being thrown within or out of a CRRC when it lands by instructing all occupants to get low and hang on to any CRRC hand-hold.

There is another less common hazardous result from launching a CRRC off a wave or wake. If the bow of the CRRC pitches down far enough while airborne, upon water contact it may penetrate under the water surface and submarine for an instant. This will bring the CRRC to a nearly instantaneous stop and can send the occupants flying forward.

The CRRC may also steer sharply to one side. If wave launches are anticipated, pay particular attention to the trim of the craft. Landing on the stern or flat of the inflatable hull is much preferred to landing bow down. The inflatable keel acts as a CRRC-long shock absorber making flat-hull landings safer, and far less jarring than with a rigid hull.

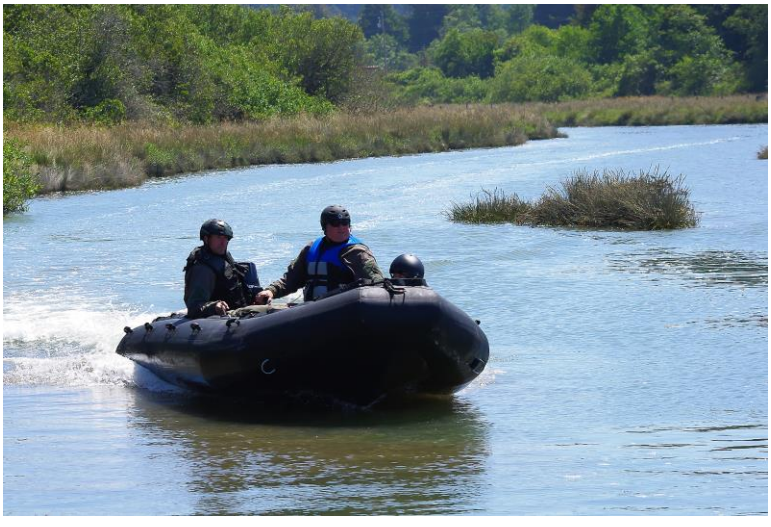
Ensure all operators are experienced and capable of operating in these conditions. This is by no means a complete list of operational hazards as there is an assumed risk inherent to boating.

Impact with Hazards

Reduce speed and proceed with caution whenever you drive a CRRC in shallow water areas or in areas where you suspect underwater obstacles may exist which could be struck by the outboard or the CRRC hull.

Avoid Impact with Hazards

The most important thing you can do to help reduce injury or impact damage from striking a floating or underwater object is to control the CRRC speed. Under these conditions, boat speed should be kept to a minimum planing speed.



WARNING:

To reduce the risk of serious injury from all or part of an outboard coming into the boat after striking a floating or underwater obstacle, maintain a top speed no greater than minimum planing speed.

Impact with Underwater Hazards

Striking a floating or underwater object could result in an infinite number of situations including:

- Part of the outboard or the entire outboard could break loose and fly into another CRRC.
- The CRRC could move suddenly in a new direction. Such a sharp change in direction can cause occupants to be thrown out of their seats or out of the CRRC.
- A rapid reduction in speed. This will cause occupants to be thrown forward, or even out of the CRRC.
- Impact damage to the outboard and/or CRRC. Keep in mind, the most important thing you can do to help reduce injury or impact damage is to minimize the CRRC speed.
- The CRRC speed should be kept to a minimum planing speed when driving in waters known to have underwater obstacles.
- After striking a submerged object, stop the engine as soon as possible and inspect it for any broken or loose parts. If damage is present or suspected, the outboard should be taken for a thorough inspection and necessary repair.
- After striking a submerged object, the CRRC should be checked for any hull tears or punctures, transom fractures, water or air leaks in MBT and keel.

Operating a damaged outboard could cause additional damage to other parts of the outboard, or could affect control of the CRRC. If continued running is necessary, do so at greatly reduced speeds.

WARNING: AVOID LOSS OF BOAT CONTROL!

Running with major impact damage can result in sudden component failure with or without subsequent impacts. Have the power package and the CRRC thoroughly inspected and any necessary repairs made.

Beaching the CRRC

Your Wing P-Series CRRC - is made of the toughest air-holding fabric available. Nevertheless, care should be exercised when beaching your CRRC. If possible, survey the landing area to ensure there are no sharp items present that may puncture or damage your CRRC.

- When possible, lift the CRRC onto dry ground above either the high tide line or high water line if on a stream, river, or lake.
- Keep in mind that a CRRC secured on a beach or in shallow water can sustain damage due to chafing caused by repeated wave action.

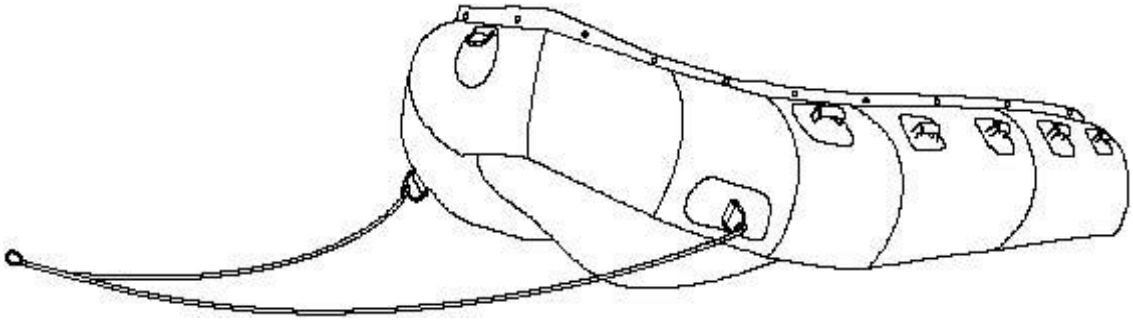
Towing

Your Wing P-Series CRRCs - are equipped with specially positioned and reinforced bow towing eyes. Don't use any other points to tow this boat or serious damage could occur to the craft.

- The P4.2, P4.7, P5.3 and P5.8 CRRCs can be towed with optional two (2) point towing bridles.
- Attach a tow line to the towing bridle.
- Begin towing boat while exercising all appropriate safety precautions.

WARNING:

IN MOST CASES, IT IS RECOMMENDED TO TOW A LIGHT LOADED CRAFT. IF IT IS NECESSARY TO TOW HEAVY LOADS, DO SO WITH CAUTION AND AT SLOW SPEEDS. WITH THE OPRTIONAL TOW BRIDLES IT IS POSSIBLE TO TOW THE P4.7 AT A LOAD OF 2700LBS, THE P5.3 AT A LOAD OF 3400 LBS, AND THE P5.8 AT LOADS OF 4000LBS UP TO SEA STATE 3. THE P4.2 HAS CURRENTLY NOT BEEN RATED

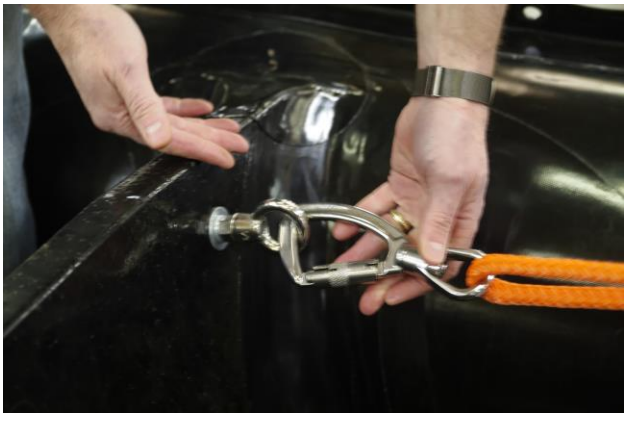


Hoisting

Your Wing P-Series CRRC are equipped with four (4) heavy duty, reinforced lifting/hoisting eyes: two (2) on the thrust-board (one port and one starboard); and two (2) on the transom (one port, one starboard).

Do not use any other points to lift/hoist this CRRC or serious damage could occur to the CRRC and/or the people hoisting the CRRC.

Transom attachment for hoisting

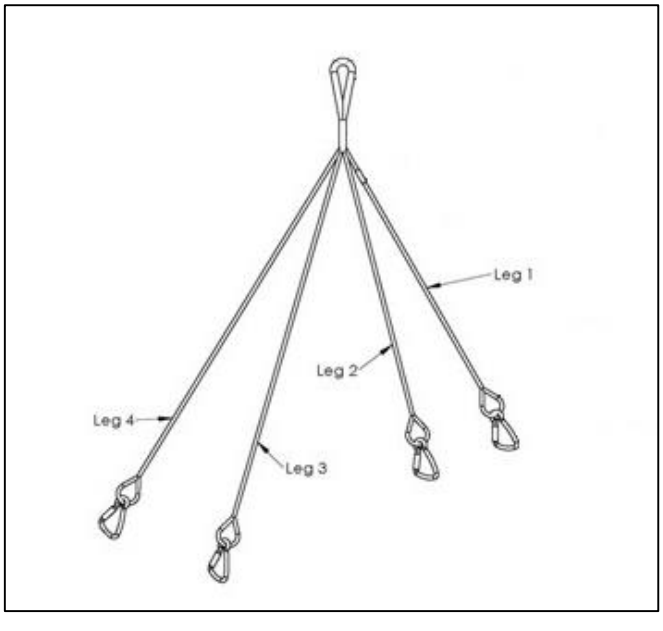


Hoisting Sling

Your Wing P-Series CRRC can be hoisted with an optional four-point hoisting sling. The sling has two long, and two shorter legs.

Attach the long legs to the bow hoisting eyes with the provided shackles and the two shorter legs to the transom-mounted hoisting eyes with the provided shackles.

After the CRRC has been placed in the water or stowed on deck or on its trailer, remove the lifting sling and stow it in a secure place.



Trailering

There are a number of optional dedicated trailers available that are built specifically to work with your Wing P4.2, P4.7, P5.3 and P5.8, with properly spaced and supportive bunks, to make towing, launching and recovery of your CRRC very straightforward and safe. Whether a specialized and dedicated trailer, or not, it is important that you learn the fundamentals to trailering your CRRC. If you are towing with a flatbed-style trailer, it is important to deflate the keel while the craft is loaded on the trailer.

Review the "dry weight" of your CRRC (which is the total boat weight without fuel and gear). It is best to trailer your craft with the minimum amount of equipment. Moderate and heavy loads while on a trailer could cause damage to the keel, the fabric hull, and MBT's especially over long periods of time and distances. Outboards, fuel, repair kits, safety equipment, and other items will easily add several hundred pounds to the weight of the boat. Follow all manufacturers' safety procedures and recommendations when trailering your boat.

Securing Your CRRC for Trailering

Be sure the boat is secure by having the winch strap latched to the boat eye and winched tight. Also, secure the boat with two straps from the transom lifting eyes (outboard of transom) down to the (holes, eyes or even the trailer frame itself). The two bow towing rings are also good hard points to attach to the trailer using straps or line. The combination of these creates a solid 5 point tie down system.

An alternative method is to, along with a bow winch, to use a full body strap across the top and near the rear of the boat (approx. 3 ft/1m forward of transom). A second full body strap may also be used near the middle front of the boat (just aft of the thrustboard) to augment the stern body strap. **Important**: It is important to secure full body straps in a manner they do not rub or flop against the boat, especially during highway speeds. *Tip: flat straps have a tendency to oscillate and loosen in the wind, particularly at higher speeds. Twisting the straps 4-8 times where they are exposed to wind, particularly over the center of the boat, helps to reduce this high frequency oscillation and reduce the abrasion on the boat that can take place as a result.*

Launching and Recovery

When launching, line up the boat with the ramp, remove all straps except the winch strap, and slowly back up to the edge of the water. Once the vehicle is secure, loosen the winch strap and detach the latch from the boat's bow eye. Secure a tag line to the boat with several feet of slack and secure the other end to the trailer. Then slowly back trailer into the water until the boat floats and the tag line is holding. At this point, retrieve the tag line from the trailer and walk the boat safely to the dock. If it is a two man operation, once the boat is at the edge of the water, the second man can enter the boat and operate as the boat floats off instead of using the tag line procedure.

When recovering the boat, line up the trailer with the ramp and slowly back up to the water. Prior to driving the boat up, flip the lever on the engine Submerse the trailer until the fenders go under the water. Slowly drive the boat between the trailer PVC guide rails (if applicable) let it float until rests on the bunks. **It is important to have the main buoyancy tubes firmly situated on the bunks.** A second person outside the boat may need to spot for proper line-up, and guide the boat with a bow and stern line. If it is close enough, pull the winch strap back and latch to the bow eye, then winch up until secure. If it needs to be closer, you can simply back the trailer a little further in the water or slowly power the boat on a little more. *Marking the trailer with high-visibility tape along the main section of the trailer to indicate forward-most bow position greatly helps with recovering the boat – particularly if the trailer is significantly longer than the boat. If there is risk of hitting your engine on the trailer, prior to recovery, put your engine in the shallow water tilt position. Follow the engine manufacturer's guidelines and cautions when doing so.*

Once the boat is positioned properly and secured to the winch, slowly pull the boat out of the water while watching to see that the boat stays secure and settles down evenly on the trailer. When the boat is fully out and on land, secure the craft with straps (as described earlier) and make sure the winch strap is securely tight.

Cleaning the Boat

IMPORTANT: Rinsing your CRRC and floorboards regularly with fresh water will help prevent the build-up of grime which could adversely affect the performance and longevity of the system.

WARNING:
Do not use harsh chemicals, petroleum, or silicon based products to clean surface or any part of the inflatable tube.

Optional products include, but are not limited to: Citra Solv (or any citrus-based cleaner), Simple Green, Dish Soap + H20

Caution: Sun tan oils may contain petroleum products which could damage the urethane fabric

Your Wing P-Series CRRC has been built to require minimal care, if used in accordance with guidelines of this Operator Manual. If your Wing CRRC is in regular use, it is good practice to visually inspect it after and before each use, for any sorts of out-of-the-ordinary abrasions, wear, cuts, etc. Regular use and care should also include washing with mild soap and water and a soft rag. It is recommended to NOT use any sort of aftermarket protectants of any type. Those with silicone or petroleum based products can be harmful to your Wing CRRC. Based on frequency of use and conditions: Fill valves and PRVs should be inspected for air holding integrity, and cleaned of grit, sand, grime, etc. Fasteners should be inspected for possible rust or signs of wear.

Storage

Your Wing P-Series CRRCs can be stored for extended periods of time. As with many items, a covered, moderately controlled environment (45-85F) best serves Long Term storage of the boats. After use, and prior to storage, the CRRCs and accessories should be washed with mild soap and water to remove dirt and other debris, and allowed to fully dry, before being stored. They may be stored partially inflated, uninflated and open, or uninflated and rolled up.

As with many things in storage, it should be placed in a location where it may not be harmed by other moving and abrading objects, sharp edges, or craft (ex: forklifts).

Clean with mild soap and water to rid it of any contaminants or grit.

- Inspect and repair any damage.
- Ensure all valves are working properly.
- Ensure all ancillary equipment is in good working order.
- Replace any damaged equipment now.
- Inspect the repair kit. Replace and missing or used items, refresh the solvents and adhesives.

Storing Ancillary Equipment

- Remove all ancillary equipment from the boat.
- Clean and inspect all equipment and repair/replace as necessary.
- Place all ancillary equipment in a secure storage area once cleaning or repair is completed.

Valves

Wing Inflatables uses a variety of fill valves, pressure release valves (PRVs), and flanges on our products. A "valve" may actually consist of multiple components.

FILL VALVE: Used for adding air to a tube or MBT. These may or may not incorporate integral flanges.

PRESSURE RELEASE VALVES: PRVs are designed to release pressure that is greater than the designed working pressure. PRVs usually have no accessible parts. PRVs will be installed into a component flange.

Fill Valves

Used for adding air to a tube or MBT. Fill valves have internal seals controlled by the stem. The stem opens and closes the internal seal. Grit and sand can become lodged within this seal, requiring regular cleaning.

Mirada Fill

Halkey-Roberts Fill

Flanges

Component flanges may be used in conjunction with either pressure release valves or fill valves. Valves are screwed into the outer part of the flange while the internal "nut" part of the flange is screwed onto the outer flange to seal against the inside of tube fabric. A "valve" may actually consist of multiple components.

Pressure Relief Valves

PRVs are designed to release excessive air pressure and sudden spikes in pneumatic pressure due to vessel impacts.

- PRVs usually have no accessible parts, hence cannot be "opened up" for cleaning.
- Cross-over/transfer valves are only supplied if your boat is equipped with our optional auto-inflation system.
- Flanges & boots: Flanges are used in conjunction with either PRVs or fill valves. PRVs & valves are screwed into the outer flanges; the outer flanges are screwed into the internal "boot" (located inside the MBT), sealing the flange & boot tight against the fabric.

Valve Cleaning

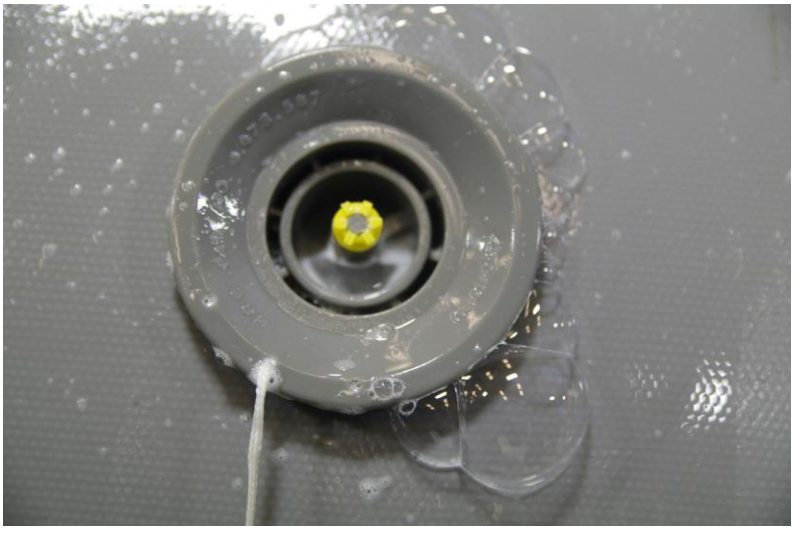
Keep valve caps (covers) in place at all times! Replace lost or damaged caps immediately.

1. Fresh water with a small amount of soap is the only recommended cleaning agent for valves.
2. Remove valves for cleaning, leave flange in place when possible. Prevent dirt, water, or other foreign material from entering open tube.
3. Valves should be inspected and cleaned regularly. Sand, or other foreign material, can become lodged in valves and should be removed.
4. To clean the valve's internal gasket, depress and twist the valve stem (clockwise) to reveal the seal area of the gasket. Rinse any foreign matter away with fresh water. If needed air can be sprayed through valve internals to clean any hard to get debris.

Valve Troubleshooting

The following steps should aid in identifying leaks and offer sealing solutions.

1. Spray the "suspect" surrounding area with mild soapy water. The soapy bubbles will help locate air leaks.
2. If bubbles come from middle of valve, debris may be lodged in the valve gasket. A good cleaning of the valve gasket (see above) is suggested.
3. If valve continues to leak, the valve seal has been damaged and the valve will need to be replaced.



- Remove valve caps. Inflate chamber to operating pressure (if possible).
- PRV: Air WILL be coming out of the middle of PRV until pressure has equalized at operating pressure. Wait at least 5 minutes before checking PRV for leaks. If PRV is still leaking, check pressure of chamber. If PRV continues to leak/bubble below these pressures, PRV needs cleaning/replacement.

If bubbles come from around the outside edge of the Valve/PRV, tighten Valve/PRV within the Flange. Hand tighten by turning clockwise until bubbles stop. Avoid over-tightening.

If bubbles come from outside edge of the flange/valve external flange and internal flange nuts need to be tightened.

Large channel lock pliers can be used to tighten Survival Engineering Inc. (SEI) external flanges. Wrap jaws with masking tape to reduce the risk of damage.

WARNING:

EXTREME CAUTION SHOULD BE USED TO NOT DAMAGE/BREAK FLANGE WITH PLIERS!!!!

Valve Removal

Removing a valve or PRV from an external flange:

Remove a valve by turning it counterclockwise using a 3 in 1 valve wrench (optional repair equipment). Be careful not to over-tighten the valve when re-installing. This valve wrench is designed to fit the PRV, Inflate/Deflate Valve and the Keel inflation valve.

Inflate/Deflate Valve

Pressure Relief Valve (PRV)

Auto Inflation Valve

Keel Inflation Valve

Removing the external flange of two-part fill valves:

1. Use a specialized valve wrench (optional repair equipment) to turn the flange counterclockwise until you feel it loosen (do this while tube is partially inflated, if possible).

2. You will need to hold the fabric down around the flange to keep the internal flange nut in place while you continue to rotate the external flange counterclockwise, until the internal and external parts come apart.

3. Once flange is apart, be SURE to keep track of the internal boot; this is very hard to relocate inside the tube once lost.

CAUTION: The internal flange nut is NOT connected to the tube and can become "lost" inside the air chamber. To avoid this, maintain pressure on the fabric around the flange to hold it in place.

Fabric Repair

This portion of the manual will guide a service technician through a repair procedure designed to address small tears to medium sized tears, and small abrasions in the MBT fabric. It is expected that the technician has some MBT repair experience, has access to an appropriate repair space, and has the correct tools and supplies as recommended in this section.

CAUTION: If the damage is large, jagged, or goes through a seam, you should have a certified RIB professional perform the work.

The preferred repair environment must be:

- Clean and dust-free
- Well ventilated
- Less than 50% relative humidity (affects dry times)
- Temperature between 65°F and 75°F (18°C and 23°C) (affects dry times) Conditions outside these parameters will affect dry times significantly.

CAUTION: When performing repairs on Polyurethane coated fabric, DO NOT use materials, solvents, adhesives, cleaning agents, or procedures commonly used for neoprene/ hypalon fabric.

Repair materials and equipment should include:

- Soft brush or paint roller
- Round-edged spatula—or putty knife in good condition — no rough edges.
- Hard roller to bond patches
- Masking tape—recommended 3M 233+ green tape
- Scissors—heavy duty
- Graduated mixing container
- Electric hot air gun
- Soap and water solution, spray bottle
- Respirator mask with filter element
- Eye protection
- Protective gloves
- Polyurethane patching material in new or good condition.
- Chemicals needed for repair, Goop, adhesive, Techthane.

WARNING:

Some of the chemicals used in this repair are hazardous. Read and understand all safety warnings on the chemical containers.

To avoid injury, use appropriate personal protective equipment (PPE) at all times during this repair.

Liquids, Solvents, and Adhesive Agents use in Repair

COATINGS

Techthane (Oil based): 2-part urethane coating (plus pigment)

Use: High damage areas or abrasion wear areas. Builds extra urethane thickness to withstand heavy usage. Also to increase UV stability of fabric. (Not intended to repair over-damaged nylon weave!)

Working life: Approx. 2 hours when catalyzed.

Shelf life: 3 months when stored in airtight containers.

Wing PN#A3511 - Techthane Coating Kit - 16oz

Goop (Oil-based): Melted Polyurethane in a solution of THF (tetrahydrafuran)

Use: To fill small scratches and repair minor cosmetic issues. Not used to fix damaged nylon.

Shelf life: 5-6 months when stored in an airtight container.

Wing PN#A3533 - Goop - 1oz

Recommended Adhesives Used In Polyurethane Repair

Clifton 2-part adhesive (Water based):

Use: Securing Polyurethane to Polyurethane

Shelf life: 5-6 months if stored unmixed in airtight containers.

Working life: Once catalyzed, 2 days (depending on airflow, and amount of adhesive mixed). The greater the quantity, the longer the working life.

Wing PN#A3530001 - Adhesive - 8oz (Part1) / Wing PN#A3530002 - 1oz Catalyst (Part2)

Clifton 1-part adhesive (Water based):

Use: Securing Polyurethane to Polyurethane.

Shelf life: 5-6 months when stored in airtight container.

Working life: 2 days (depending on airflow and amount of adhesive mixed. The greater the quantity the longer the working life.

Wing PN#1800035 - Adhesive - 4oz

"Flashing-Off" or "Drying to the Touch"

MEK (Methyl ethyl ketone) and acetone are chemicals that serve to clean, soften, and open the pores of the Polyurethane - a necessary process for any successful repair. In the following fabric repair sequences, reference is made to MEK "flashing-off" or "drying to the touch" before applying Polyurethane coatings. Both are terms for evaporation. In other references, directions are to immediately apply adhesives BEFORE the MEK flashes or dries to the touch. The reasons for the different procedures are that Polyurethane coatings are oil-based, while MEK and the Clifton adhesives are water-based. When applying an oil-based coating on a water-based solvent it is necessary to let the solvent evaporate, or flash-off before application or the Polyurethane coating won't set properly. On the other hand, MEK and the Clifton adhesives are compatible. The MEK helps to create a better bond wet than it would after evaporation, or flashing.

CAUTION: The repair environment and materials will have a direct effect on the integrity of the repair. For best results follow these instructions as closely as possible.

Damage Assessment

- Small abrasions/wear-through spots can be sealed using adhesive, Goop or Techthane, so long as the polyester weave is not damaged, or separated.
- Small tears in the fabric of less than 2 inches (5 cm) can be repaired using only an external patch.
- Tears in the fabric between 2 and 5 inches (5 to 30 cm) should be closed using an internal and external patch.

WARNING:

Tears larger than 6 inches (30 cm), baffle repairs, or a repair needed over a seam should be done by a Wing factory representative.

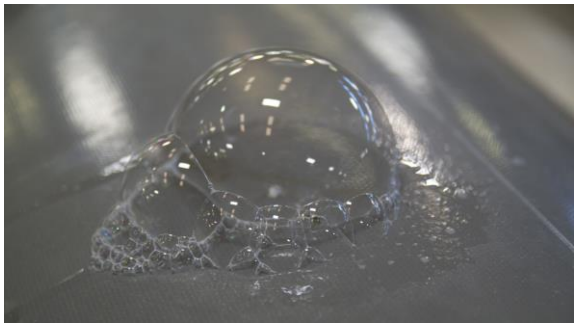
New Polyurethane Fabric Repair

Fabric preparation for small leaks or pinhole leaks on new and uncoated fabric

(Materials coated in either Techthane or "dull coat" use the weathered fabric preparation procedures.)

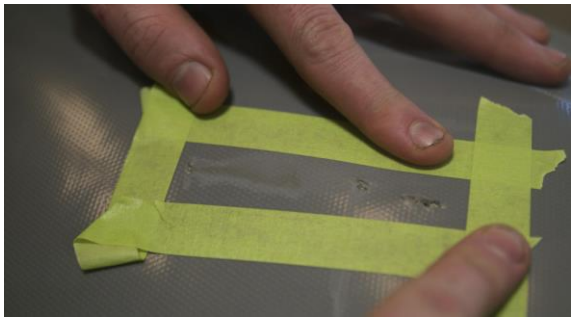
- Deep scratches or abrasion marks that expose the polyester base fabric can occur from time to time but should not be a point of great concern as they are easily repaired.
- The heavy-duty polyester fabric will provide excellent puncture and tear resistance but abrasions and scratches that expose the polyester base fabric should be repaired regularly to protect the air-holding capacity.
- Adhesive can be utilized to seal these small holes, or liquid urethane called "Goop" is available upon request from Wing Inflatables.
- For longer scratches, or small scratches in high damage areas, Techthane can be used to seal leaks that have NOT damaged fabric weaves.

Using Goop or Adhesive



1. **Inflate boat to full pressure (4.4 psi).**
Spray area with soapy water and mark leaks with grease pencil or by taping off areas to be repaired.

IMPORTANT: Ink and markers will permanently mark the fabric and are NOT recommended for use.
For best results, tape off area.



2. **Deflate boat completely. Do not try to seal leaks while the tube is inflated.** Prepare the area by wiping solvent like acetone or MEK (methyl ethyl ketone) inside the outlined area.

3. **Tape off the area to be repaired.**

4. **Wipe area with solvent.**

5. **Paint on Goop or adhesive.**

IMPORTANT: If you're using Goop, allow the solvent to dry or flash off before applying Goop to fabric— about 20 seconds. If using adhesive, apply adhesive immediately BEFORE the solvent flashes-off

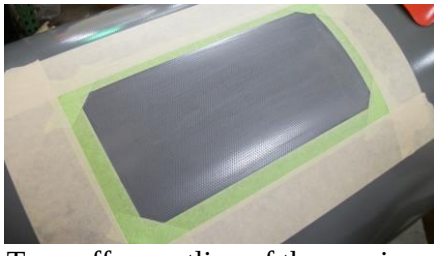
6. **Allow adhesive or Goop to dry 10-20 minutes; then apply second coat to area. Do not apply solvent for the second coat of adhesive.**

7. **Remove tape immediately after second coat, unless damaged area is not fully covered.**

8. **Apply a third coat as necessary.**

9. **Allow drying completely before re-inflation;** minimum cure time two hours. Twelve hours is recommended.

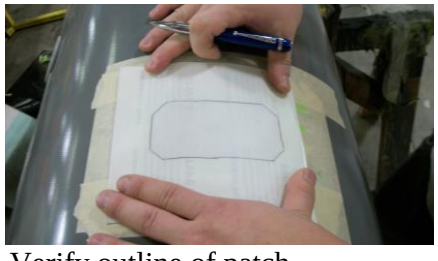
Repairs Using Tear Aid



1. Tape off an outline of the repair area with approx 2 inches on either side of leak

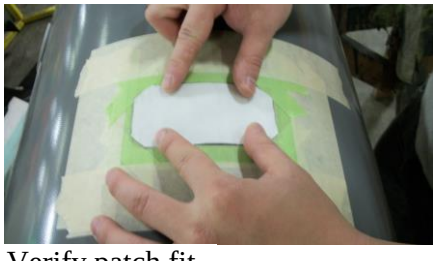
2. Lightly scuff surface with sandpaper

3. Draw outline of repair area on Tear Aid.

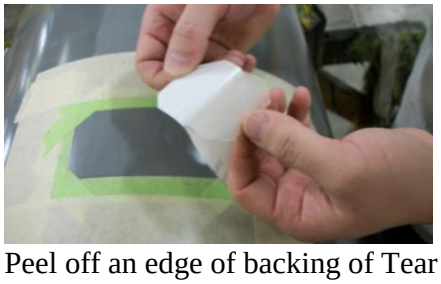


4. Verify outline of patch

5. Cut out Tear Aid patch

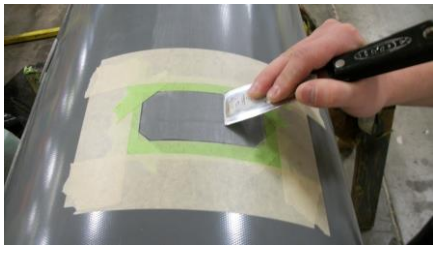


6. Verify patch fit.



7. Peel off an edge of backing of Tear Aid

8. Place patch on area, slowly peeling off the back during placement.



9. Apply pressure to Tear Aid with putty knife or similar firm edge (i.e. credit card or plastic knife).

10. Peel away outline tape, inspect.

Weathered or Coated Fabric

Inflatable tubes that are weathered or dull-coated require fabric preparation before adhesive will bond.

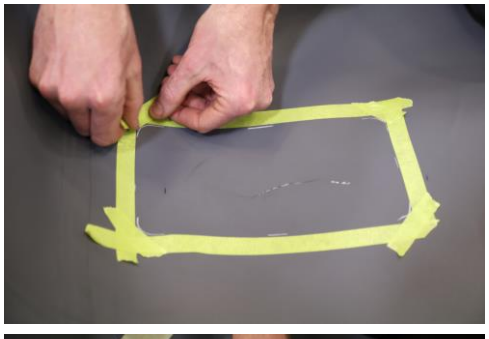
- Preparation: 60-80 grit sandpaper recommended. Caution: Do not sand through Polyurethane coating into polyester weave.
- Clean with alcohol, MEK, or toluene.

Tears, Punctures & Large Repairs

Preparing Polyurethane Fabric for Repair

1. **Inflate boat to full pressure (4.4 psi).**
Spray area with soapy water and mark leaks with grease pencil or by taping off areas to be repaired.
IMPORTANT: Ink and markers will permanently mark the fabric and are NOT recommended for use. For best results, tape off area.

2. **Apply a border of masking tape about 1/4" outside of the marked line.** This will give you an area slightly larger to prepare before applying adhesive.



3. **Utilizing sandpaper, 60-80 grit, sand entire area to an even dull sheen. DO NOT over-sand and expose the polyester fabric weave.**
Sand up to the masking tape edges thoroughly. Sanding is easier on an inflated tube (opposed to a deflated tube). Sanding opens the pores of the urethane surface to allow solvent to penetrate the underlying fresh urethane. Sanded surface should have an even, dull sheen without speckles or shiny spots. When working near or over seam tape be sure area is thoroughly sanded.

4. **Wipe off all sanding grit with a clean, dry cloth (clean with alcohol if possible).**

5. **Apply a new masking tape edge to sanded area, 1/4" narrower than sanded area (this will ensure a good bond with tube).**

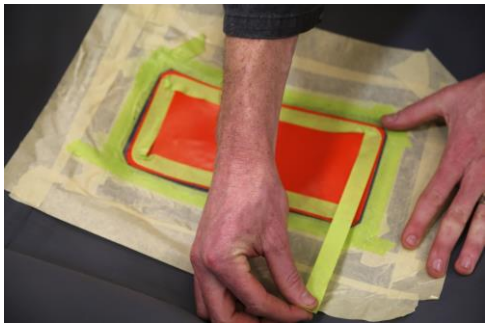
6. **Prepare the area to receive adhesive with a solvent (i.e., acetone or MEK) by wiping the solvent inside the outlined area.** NOTE: To ensure proper adhesion, apply adhesive to prepared area IMMEDIATELY, before the solvent flashes-off or dries.

7. **Prepare the surface of patch material with solvent and apply adhesive.**
If the patch is weathered Polyurethane material, repeat sanding process before applying solvent and adhesive.

8. **Allow glued areas to dry to touch, not sticky. Apply a second coat of adhesive to previously glued areas.**
NOTE: do not apply solvent between first and second coats of adhesive.

9. **Allow adhesive to dry thoroughly, approximately 20 minutes.**

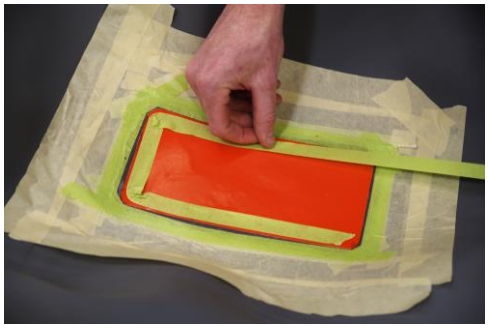
Bonding Patches to Polyurethane Fabric



Caution: Before using a putty knife or any flat-bladed tool on any inflatable product, ensure that there are no sharp edges or corners on blade to prevent further damage to material.

1. **Round patch corners to prevent "snagging" when the boat is back in use.**
Line up patch to the taped off area.

2. **Starting at one edge, utilize a hair dryer or heat gun to warm both surfaces and apply pressure using putty knife or hand roller.**
The heat activates the adhesive.
NOTE: Do not overheat; the fabric should be warm to the touch, no more!



3. **Applying pressure with a putty knife or hand roller, work the patch down from one edge so as to avoid trapping air bubbles under the patch.**
If bonding over seams, take extra care to assure bond between fabric and patch.

4. **If adhesive is warm, patch edges may pull up. Allow adhesive and patch to cool.**
Once cool, lightly run a putty knife around the edges. If an edge has not adhered, apply more heat and apply pressure. If having problems with adhesion, see troubleshooting guide at end of section.

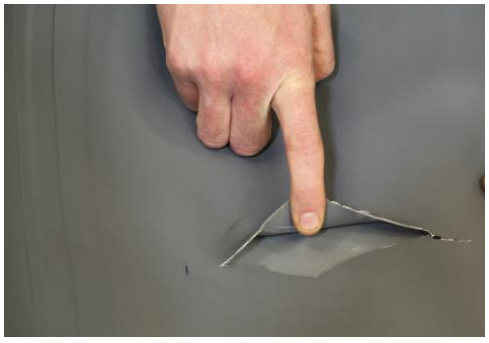
IMPORTANT NOTE REGARDING SEALING EXPOSED EDGES OF FABRIC:
We recommend utilizing either Clifton one-or two-part adhesive or Goop to seal the exposed edges of fabric patches against water intrusion and air loss through patch edges.

5. **Tape off the repair area to original sanding lines to hide all repaired areas (Goop and adhesive WILL NOT STICK if applied outside sanded areas).**

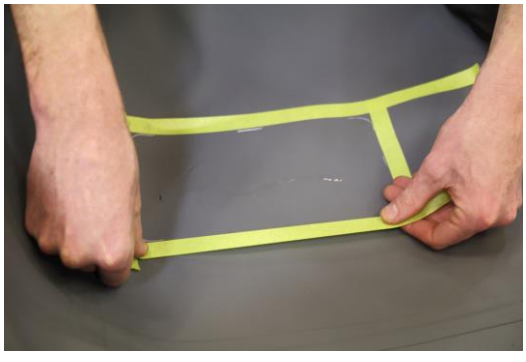
6. **Use a brush to apply adhesive or Goop carefully around patch edges.**
IMPORTANT NOTE: If using adhesive, let the solvent flash-off.

7. **If using Goop, apply immediately after solvent.**

Large Tear: Inside/Outside Patch Repair



1. **Center your inside patch over the tear. Mark the fabric. Give your patch a horizontal and vertical centerline for positioning under the tear.**

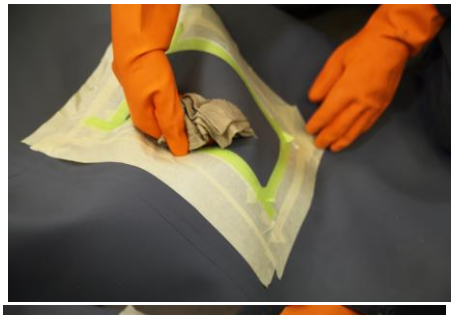


2. **Tape off area to be prepared for repair.**

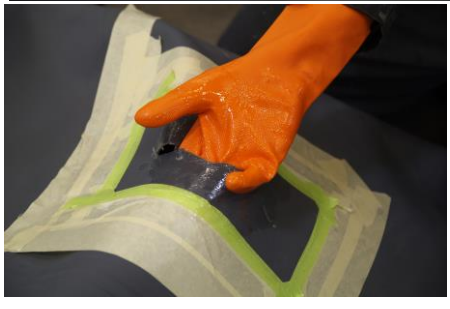
3. **Sand area using 60-80 grit sandpaper.**

4. **Tape off 1/4" inside sanded area and clean with solvent.** (This assures adhesive on sanded fabric only.)

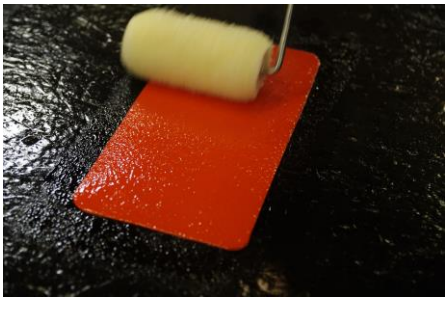
5. **Apply MEK or acetone to patch area inside of fabric.**



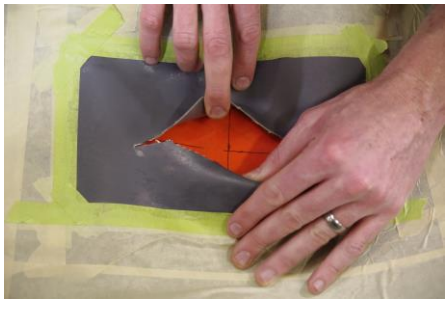
6. **With gloved hand, immediately apply adhesive to inside patch area of fabric.**



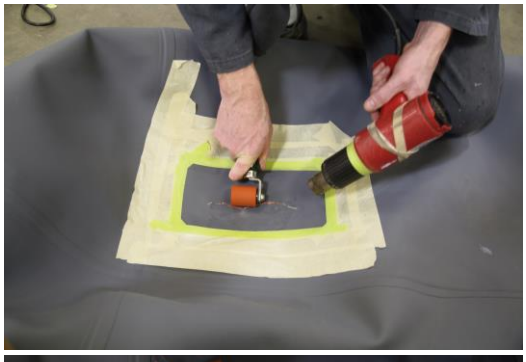
7. **Prepare both inside and outside patch with solvent, immediately followed by adhesive.**



8. **Insert inside patch through tear and center underneath tear.**



9. **Apply heat and pressure.**



10. **Wipe fabric with solvent.**

11. **Immediately apply outside patch, applying heat and pressure on one edge. Carefully work heat and pressure towards far edge avoiding air pockets or bubbles.**

12. **Allow patches to cure before inflation a minimum of 2 hours (24 hours is recommended).**

13. **Upon inflation apply soapy water to ensure quality of patch.**

IMPORTANT NOTE REGARDING SEALING EXPOSED EDGES OF FABRIC:
We recommend utilizing either Clifton one- or two-part adhesive, or Goop to seal the exposed edges of fabric patches against water intrusion and air loss though patch edges.

Field Repair/Solvent Bonding Technique

(If repairs are needed without access to heat gun.)

1. **Follow steps 1-9 of "Fabric Preparation" to prepare the surface to receive the patch, then complete the additional steps in this section.**

2. **Line up the patch to the taped off area on the craft receiving the patch. Make sure the patch corners are rounded.**

3. **When second coat is dry on both patch and tube (at least 20 minutes) reactivate the adhesive by lightly wiping both surfaces with solvent and immediately apply patch to surface.**

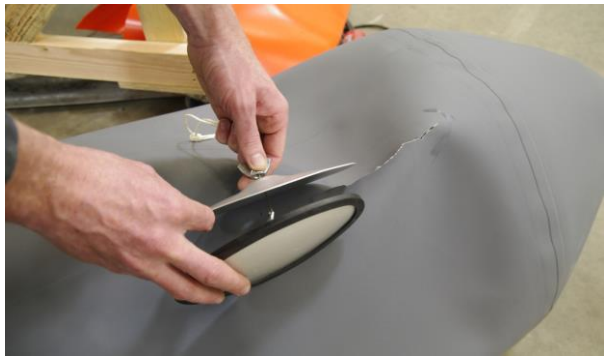
4. **Starting at one edge apply pressure to ensure contact between the surfaces. Avoid air bubbles. Apply extra pressure when bonding over seams. Glued patch and boat will be "tacky" so take this bonding slowly to prevent a second attempt.**

5. **Wait 5-10 minutes and check patch edges. Wait additional time if necessary. If edges have not adhered, flash with solvent and press down again.**

6. **If possible, wait at least 24 hours before inflation of MBT (a minimum of 12 hours is required).**

Emergency Field Repair with Clamshell Plug

For emergency repairs of punctures or tears in fabric, use the appropriate sized clamshell plug (optional repair equipment).



1. **Loop cord around wrist to prevent loss of assembly.**

   Dip clamshell assembly in water to assist in insertion.

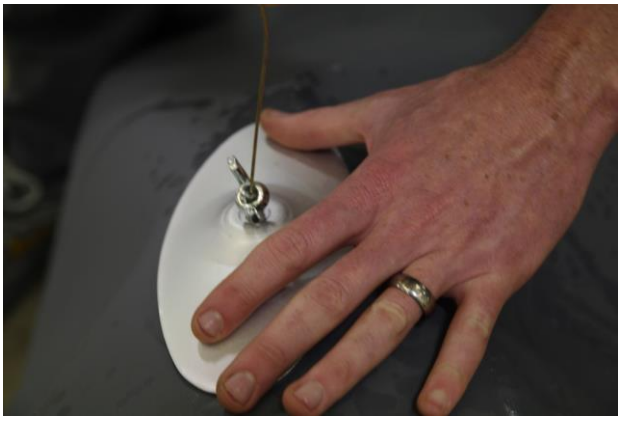
2. **Push bottom plate through hole in fabric. (If hole is too small, enlarge it carefully so bottom plate can be forced in.)**

3. **Pull bottom plate back against inner fabric surface and slide top plate over threaded stud and against outer fabric surface.**

4. **Adjust clamshell to cover hole completely. Hold in place.**

5. **Tighten wing nut firmly against top plate.**

6. **Re-inflate MBT.**



Inflation & Testing of a Repaired Tube

Following a repair, the MBT should be inflated and the pressure should be verified when the ambient air temperature is between 65°F and 75°F (18°C and 24°C).

- Pressurize the repaired tube to 4.4 psi (303 mbar).
- Apply a soap and water solution to the entire repair area. Air leaks will show up as small bubbles.
- Continue this test and monitor collar pressure for at least three hours.

Repair Troubleshooting

Having problems bonding a patch to your craft? Try the following:

Q: Why do the edges of a new patch keep popping up?

A: Warm patch. The patch needs to cool off completely before checking the edges with a putty knife. Remember: heat activates the adhesive, and pressure bonds the adhesive together. If your patch is still warm, the adhesive is still activated and WILL NOT BOND.

A: Adhesive is not re-activating correctly with heat. Try a light solvent wipe over suspect adhesive to reactivate adhesive, then, once dry, try re-heating and bonding the patch.

A: Solvent not applied correctly. The adhesive may not be chemically bonded to the patch fabric or the area to be patched. With a solvent, remove the suspect adhesive from the fabric by rubbing with a solvent-saturated cloth. Thoroughly remove the adhesive and correctly clean the fabric with a solvent, then apply a new coat of adhesive immediately. Allow to dry.

The two-fold purpose of the solvent is to clean foreign debris and oils from the surface of the urethane and to open the pores in the fabric to receive the chemical bond of the adhesive.

A: Improper sanding of old fabric. Remove the patch (re-warm and gently remove) and remove all adhesive from both surfaces with a solvent. Now, re-sand the old weathered fabric. You only want to scuff the urethane surface to allow the solvent to prepare the underlying fresh urethane for adhesive application. Sanded surface should have an even dull sheen without speckles or shiny spots. Repeat the process of cleaning with a solvent and apply adhesive immediately. Allow to dry.

General Boat Inspection

- Inflation valve covers should be secured in closed position while tube/boat is in use, as well as when in storage.
- Avoid the creation of excess heat friction on tubes (i.e., dragging rope over tubes).
- Check all fill valves & PRVs on a regular basis to ensure they are clean and working properly.
- Make sure your repair kit is complete; replace any consumed items. Inspect your repair kit every six months. (Adhesive needs to be replaced every two years.)
- Repair cuts/abrasions promptly as outlined in Wing's Repair Instructions in this manual.
- Regular use of a Maintenance Log will help in your annual vessel inspections. The regular cleaning of valves and tube fabric will help your boat last longer and perform better.

Boat Maintenance Do's & Don'ts

DO…

- Put valve covers on when boat is in use and when it is stored.
- Clean boat with fresh water after each use (use non-abrasive cleaner if needed).
- Completely dry boat after each use.
- Store boats inside in a clean, dry environment. This will prolong the life of the boat.
- Avoid the creation of excess heat friction on tubes (i.e., dragging rope over tubes).
- Protect inflated and especially deflated boats from sharp objects and abrasion during transport.
- Clean fill valves as needed by disassembling and wiping down rubber gaskets and contact points. (When re-installing valves, make sure valve is good and tight.)
- Check pressure relief valve on a regular basis to ensure it is clean and working properly. (A clogged pressure relief valve can cause damage to the floor structure.)
- Make sure repair kit is complete. Add items needed. Inspect repair kit every six months. (Adhesive needs to be replaced once a year.)

DON'T…

- Do not use chemicals to clean the surface or any part of the boat, except for adhesive preparation during repairs or additions.
- Do not over-inflate.
- Do not store boats in damp or humid places for long periods. (Moisture-loving organisms will attack and degrade fabric and adhesive.)
- Do not create excess heat friction on tubes (i.e., dragging rope or webbing over tubes).
- Do not hesitate to run your Wing boat hard and fast, save some lives, and kick some ass... while acting responsibly, of course!

Wing Serial Number Reference Instructions
Example: ERX1234RB414

ERX - Company Moniker
1234 – Serial Number
R – Type of Product (R=RHIB W=Raft F=Fuel Bag C= Cat etc.)
B4 – Manufactured month and year (A= Jan. L= Dec.)
14 – Model Year

Designed Smarter, Built Tougher.

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