

When you mix WEST SYSTEM Resin and Hardener you create a tough, waterproof coating that you can apply to nearly any surface. Use the mixture to apply fiberglass tape for reinforcing and abrasion resistance. Add high-density filler to make a strong, gap-filling adhesive that bonds to wood, fiberglass, steel and aluminum. Add low-density filler to create an easily sanded, non-shrinking surface filler.

The repairs described in these instructions are just the beginning of what you can do with the Maxi Repair Pack. The resins, hardeners, fillers, fabric and application tools in this kit offer hundreds of repair, reinforcing, protecting and possibilities for wooden boats, fiberglass boats and much more.



### Your reliable solution

WEST SYSTEM is the world's leading brand of marine epoxy. It was created by Gougeon Brothers—sailors, boat builders and formulators who literally wrote the book on wood/epoxy boatbuilding. As sailboat and iceboat racing fueled their quest for lighter and stronger structures, it ultimately led to a stronger, more versatile, and more reliable epoxy.

Over the past 40 years, reliability has been the hallmark of WEST SYSTEM Epoxy. We adhere to the highest standards of quality assurance in our formulating and manufacturing practices, from raw material qualification to testing and certification of finished resins and hardeners. This means that properly mixed WEST SYSTEM resin and hardener will cure as it is supposed to, every time.

When you need an extremely strong, water-resistant coating or adhesive, WEST SYSTEM epoxy is your reliable solution. This commitment to producing quality, reliable epoxy products has earned us certification to the ISO 9001:2000 standard.

### Backed by reliable technical advice

If you have any questions or comments about the use of WEST SYSTEM products or would like to talk about the suitability of WEST SYSTEM Epoxy for a project, contact our helpful and knowledgeable Gougeon Brothers Technical Staff. Call 866-937-8797 (toll free).

Because Gougeon Brothers Inc. cannot control how this product will be used, it makes no warranties, either expressed or implied, including no warranties of merchantability and fitness for purpose intended. Gougeon Brothers will not be liable for incidental or consequential damages.

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### Free information

If you have a boat repair or building project, or if you just want to know more about WEST SYSTEM Epoxy and what you can accomplish with it, visit [www.westsystem.com](http://www.westsystem.com), or call 866-937-8797 to send for the FREE WEST SYSTEM *User Manual & Product Guide*.

**002-950 WEST SYSTEM User Manual & Product Guide**—This 30-page, illustrated guide is essential for first time WEST SYSTEM Epoxy users. It covers epoxy handling, safety and the basic techniques used in most repair and building procedures. It includes complete product descriptions, selection and coverage information, and a problem solving guide.

Ask for the FREE Literature Pack and you will receive the *User Manual & Product Guide*, as well as 000-425 *Other Uses—Suggestions for Household Repair*, the latest issue of *Epoxyworks* magazine, the current product price list and the *Stocking Dealer Directory*. Subscribe to *Epoxyworks*, a magazine about building, restoration and repair with epoxy. A subscription includes two FREE issues per year.

### Boat repair manuals and DVD

For larger wooden and fiberglass boat repair projects WEST SYSTEM offers comprehensive repair publications and a DVD, loaded with reliable, up-to-date repair information.

These WEST SYSTEM repair manuals and DVD are available from your local WEST SYSTEM dealer, by calling Gougeon Brothers Inc. at 866-937-8797, or visiting [www.westsystem.info](http://www.westsystem.info). Downloadable versions of these manuals are available at [www.westsystem.com](http://www.westsystem.com).

#### 002-550 Fiberglass Boat Repair and Maintenance

A complete, illustrated guide to repairing fiberglass boats with West System Epoxy. It's 76 pages include detailed instructions on repairing core damage, keel damage and structural reinforcing. Also covers fairing keels, hardware bonding, finishing and installing teak veneers.

#### 002-650 Gelcoat Blisters: Diagnosis, Repair & Prevention

This 52-page manual provides a thorough explanation of osmotic blistering, and detailed, illustrated instructions on effective laminate drying techniques, repairing localized and severe interlaminar blister damage, techniques for applying an effective epoxy barrier coat and more.

#### 002-970 Wooden Boat Restoration & Repair

This 80-page manual shows you how to do professional level repairs and renovations that dramatically extend the life of your wooden boat. Dry rot repairs, structural frame repairs, and plank repairs using modern products and techniques are among the many solutions covered in this fully illustrated manual. For boats that belong on the water, not in museums.

#### 002-898 WEST SYSTEM Epoxy How-To DVD

Fiberglass boat repair techniques are demonstrated in this 59-minute instructional DVD. Learn how to repair cored and non-cored hulls and decks, and how to repair and prevent gelcoat blisters. Interactive menus also take you through Basic Application Techniques, everything you need to know about the use of West System Epoxy, including epoxy safety and the fundamentals of coating, bonding and fairing.

## Safety

- Avoid skin contact with resin, hardener or mixed epoxy. Wear protective clothing.
- Avoid eye contact with resin, hardener or mixed epoxy. Wear protective glasses. In case of contact with eyes, flush with water for 15 minutes. If discomfort persists, seek medical attention.
- Avoid inhalation of vapors. Provide adequate ventilation. Wear a dust mask when sanding epoxy, especially epoxy that has not fully cured.
- Do not allow a large quantity of mixed epoxy to cure in a mixing container, or other confined space. A large contained mass of curing epoxy can give off hazardous vapors and generate enough heat to cause burns and melt plastic mixing pots.
- KEEP OUT OF THE REACH OF CHILDREN

## Preparation

- Check all parts for proper fit.
- Be sure all surfaces to be coated are clean, dry and sanded.
- Gather all necessary application tools, clamps and equipment before mixing epoxy.

## Mixing and curing

Empty the contents of one resin and one hardener packet into a mixing cup. Mix thoroughly. Use the flat end of the mixing stick and scrape the sides and bottom of the mixing cup as you mix.

Mixing the resin and hardener together starts a chemical reaction that transforms the combined liquid ingredients into a solid. After mixing 105 Resin and 205 Fast Hardener, you will have 10–15 minutes, at 70°F (21°C), to apply the mixture before it begins to gel.

Epoxy cures faster in warmer temperatures and thicker applications. When the mixture is spread-out in a thin layer, the heat is dissipated and the working time and cure time are extended. Epoxy cures slower in cooler temperatures and thinner applications.

The epoxy mixture will reach a workable cure in five to seven hours at 70°F (21°C). Clamps can be removed and the epoxy may be sanded, but it should not be subjected to high loads for 24 hours. When a quicker cure is desired, applying moderate heat will substantially reduce cure time.

Slower hardeners are available in standard sized containers for larger jobs. They provide extended working time at normal temperature and useful working times at higher temperatures. For information visit the WEST SYSTEM website or contact West System Inc.

## Cleanup

Clean uncured epoxy from skin and clothes with a waterless skin cleaner, followed by washing with soap and water.

Remove excess epoxy from work surfaces with the flat end of a mixing stick or with paper towels. Cleanup residue with a solvent such as acetone or lacquer thinner.

## Bonding

Glue most parts together in a two-step operation. First, *wet-out* (pre-coat) bonding surfaces with unthickened epoxy to improve adhesion and help prevent an epoxy-starved joint, especially when bonding porous surfaces. A pipe cleaner or syringe may be used to wet out hard to reach areas such as fastener holes when bonding hardware.

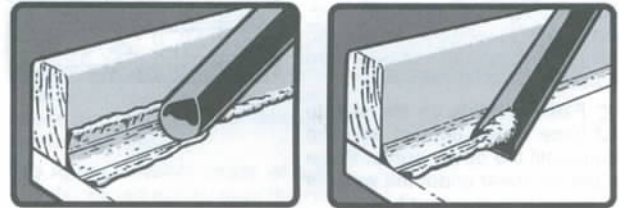
After bonding surfaces have been wet out, add 406 Filler to an epoxy mixture, thoroughly mixing in filler until it reaches the desired consistency—thick (non-sagging) for larger gaps and uneven mating surfaces—thinner for tight joints or large smooth surfaces.

Apply a generous amount of the thickened epoxy mixture to one of the surfaces and clamp the components in position before the epoxy begins to gel. Use just enough clamping pressure to squeeze a small amount of thickened epoxy out of the joint. Allow the epoxy to cure thoroughly before removing clamps or stressing the joint.

Use 406 Filler (a high-density filler) to thicken epoxy for structural bonding and gap-filling. Use the syringe to inject unthickened to moderately thickened epoxy into small cracks or holes.

## Making fillets

When parts are joined at or near right angles, fillets can be used to add considerable strength to the joint by increasing the surface area of the bond. Shape the excess thickened epoxy that has squeezed out of the joint into a cove section using the round end of a mixing stick. Add more thickened epoxy as necessary to shape a smooth fillet of the desired size. Clean off the excess mixture with the beveled end of the mixing stick.



## Fairing (surface filling)

Wet out the surface with unthickened epoxy to improve adhesion. Stir 407 Filler into an epoxy mixture until it reaches the consistency of stiff peanut butter. Use the mixing stick to apply and shape the mixture slightly higher than the desired surface contour. Sand to shape after the epoxy cures. Seal the sanded fairing compound with unthickened epoxy before painting.

Use 407 Filler (a low-density filler) to thicken epoxy for light bonding, and surface filling and shaping. The more 407 Filler you add to the epoxy—the easier it will be to sand.

## Coating

Apply the epoxy mixture as a coating using a disposable brush. Brush the epoxy over the area and finish with long, light strokes to evenly distribute the epoxy over the surface. Add a small amount of 406 Filler to create a thicker coating. Keep in mind that the thicker the coating—the less smooth it will be.

## Repairing delamination of core panels

**1** Define the delaminated area.

When pushed or stepped on, delaminated skin feels flexible before contact with the core and indicates a gap between the skin and core. Also, delaminated skin sounds flatter—less resonant than solid laminate when tapped with a coin or other small hard object.

**2** Dry the core thoroughly before re-bonding. Drill  $\frac{1}{4}$ " (6mm) holes, 1" (2.5cm) apart and about 3" (7.5cm) beyond the delaminated area. Drill through the skin and about  $\frac{1}{3}$  of the way into the core.

Use a moderate heat source such as a hot air gun or heat lamp to accelerate the drying process. Take care not to damage the skin with excessive heat. A sample drilling from the core will indicate the degree of dryness.

**3** Thicken an epoxy mixture with 406 (high-density) Filler to a "catsup" consistency. Load into a syringe. Trim the syringe tip as necessary.

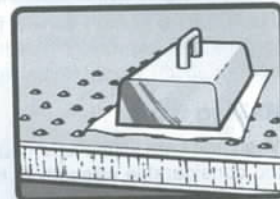
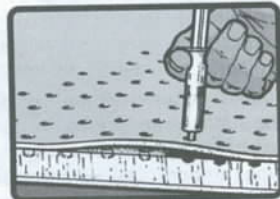
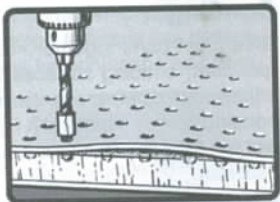
**4** Inject the thickened mixture into all holes drilled in the delaminated area. Flex the skin several times to work the epoxy into all areas between the skin and core.

**5** Place weights on the skin to force it into contact with the core until the epoxy cures. Place a plastic sheet under the weights to prevent inadvertent bonding.

**6** Sand the surface fair with 80-grit sandpaper after the epoxy is completely cured. Fill any remaining low spots with epoxy and 407 Filler thickened to a "peanut butter" consistency. Sand when cured and coat with unthickened epoxy.

**7** Wet sand when cured to prepare for painting or gelcoat. Follow the paint manufacturer's recommendation for final preparation and application.

For repair of large delaminated areas, refer to Section 5 of 002-550 *Fiberglass Boat Repair & Maintenance*.



## Repairing loose hardware Installing new hardware

**1** Remove the existing hardware. Protect the surrounding area from spills.

**2** Clean dirt, old sealants and other materials from hardware, deck surface and fastener holes. Drill oversized holes to expose uncontaminated deck material and increase bonding area. (If backing plate and bolt are not used, drill the oversize hole only  $\frac{3}{4}$  of the pilot hole depth.)

Allow core material to dry thoroughly. Use a heat gun to speed drying.

**3** Place hardware in position. Trace the perimeter with a pencil. Remove the hardware and tape the marked perimeter with electrical tape.

**4** Sand the surface thoroughly to a dull finish.

**5** Coat both the deck surface and the hardware mating surface with the epoxy mixture. Wet out the inside of the fastener hole with an epoxy-wet pipe cleaner, or by injecting epoxy with a syringe.

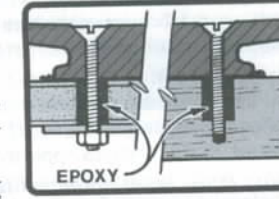
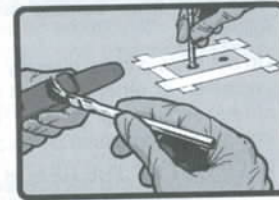
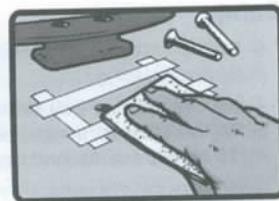
**6** Scrub all epoxy-wet hardware surfaces with 50-grit sandpaper before epoxy gels.

**7** Mix epoxy and 406 (high-density) Filler to a "mayonnaise" consistency. Apply generously to the mating surfaces, in fastener holes and on fastener threads. Use a syringe to fill holes, if necessary.

Optional: coat fastener threads and hardware base with paste wax if you anticipate removing hardware in the future.

**8** Position the hardware and tighten the fasteners until some of the epoxy mixture squeezes out. Do not over tighten.

**9** Clean excess epoxy away with the flat end of the mixing stick. Remove the electrical tape. Allow to cure for 24 hours at 70°F (21°C) before stressing.



## Repairing minor cracks and scrapes on fiberglass decks and hulls

**1** Remove loose or damaged material. Open cracks with a sharp, "V"-shaped tool, scraping down to the bottom of the crack. Dry out the damaged area if necessary. Feather the edges with a scraping tool or 100-grit sandpaper.

**2** Apply enough epoxy mixture to thoroughly wet out the damaged cavity.

**3** Blend 406 (high-density) Filler with the remaining epoxy mixture to make a thick, non-sagging mixture. Trowel the mixture into the pre-wet cavity.

**4** Allow to cure about 24 hours at 70°F (21°C).

**5** Sand to shape before painting. Use 80-grit sandpaper to level any ridges or bumps if necessary. Wet sand to fair with 220-grit paper. For high-gloss paints, continue wet sanding down to 400-grit or follow the paint manufacturer's recommendations for final preparation and application.

Marine-grade paints or gelcoat provide the ultraviolet protection required for epoxy. Two-part polyurethane paints provide the most durable long-term protection.

### For deeper cracks

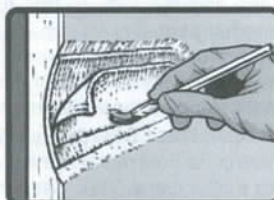
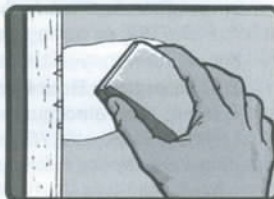
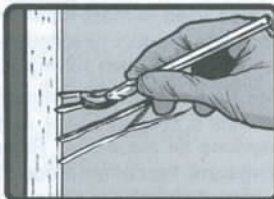
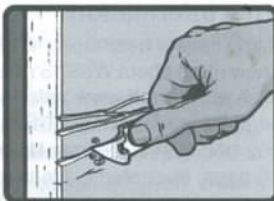
**1** Grind out the crack, until you reach solid laminate. Taper all sides of the void to a shallow (about 12:1) slope.

**2** Cut multiple pieces of fabric to fit within and fill the void. Cut each layer progressively smaller, with the largest, bottom layer about ½" smaller on each edge than the void.

**3** Wet out the fabric with epoxy using a disposable brush. Apply largest piece in the center of the void. Apply the smaller pieces centered evenly over the larger pieces. Wet out the entire void with epoxy and allow to cure.

Proceed to Step 3 above for finishing when the epoxy begins to gel, but is still tacky.

Refer to the manuals and DVD on the back of this sheet for more detailed information on repairing and finishing damaged fiberglass.



## Repairing damaged keels Metal bonding and fairing

**1** Plan access to the keel's damaged area when the boat is hauled.

**2** Dry the damaged area. Use a heat gun or fans to accelerate drying.

**3** Remove any loose plastic filler or lead chips. Always wear a dust mask, especially when working around lead.

**4** Forge displaced lead toward voids using a hammer. With a lead keel, a bulge each side of a dent is typical. Some lead may be saved.

**5** Coat the remaining bulges with petroleum jelly to improve cutting performance, and plane or file flush. After bulges have been faired, clean the area with a solvent. Allow the surface to dry completely. Scrub the surface with a wire brush to expose fresh lead.

**6** Brush epoxy into the remaining voids. For maximum adhesion, immediately scrub the wet epoxy-coated metal surfaces with a wire brush.

**7** Apply epoxy thickened to "peanut butter" consistency with 407 (low-density) Filler to fill voids. Allow the mixture to cure then sand fair. Repeat as necessary to achieve the desired smooth shape.

**8** Apply several coats of unthickened epoxy over the repair and allow to cure. Wet sand the final coat before applying bottom paint. Follow the paint manufacturer's recommendation for final preparation and application.

Epoxy also bonds well to cast iron keels and can be used to shape and fair both lead and cast iron keels for optimum performance. For detailed information on fairing keels refer to 002-740 *Final Fairing & Finishing*, published by Gougeon Brothers Inc.

