# BEAM & FOLDING SYSTEM - CARE AND MAINTENANCE

The beams and folding system on all Farrier designs have been relatively trouble free, but they should be regularly inspected as they are frequently under high stress. They can also suffer damage from collision and thus should be inspected very carefully after any significant impact.

## Original Trailertri Beams

These are made from wood epoxy and have been problem free. Only thing to watch out for are any visible cracks or splits, or rot, which can usually be found by just probing the beam and looking for soft spots.

There should also be drain bungs on the lower aft sides of these beams and if not, there could be unseen problems inside the beam from water that then has no escape. However, if built to plan, and sealed in epoxy, rot is rare.

## Tramp Beams

These are aluminum sections, and have also been problem free. Just check for any obvious corrosion. However, avoid removing any brackets if possible, as these may be 'frozen' to the beam if an insulating compound was not used between the aluminum and any stainless steel bolt threaded into the beam. The bolt can then shear off which is virtually impossible to repair. To disassemble, only the pivot pins should be removed.

## Production F-Series Beams

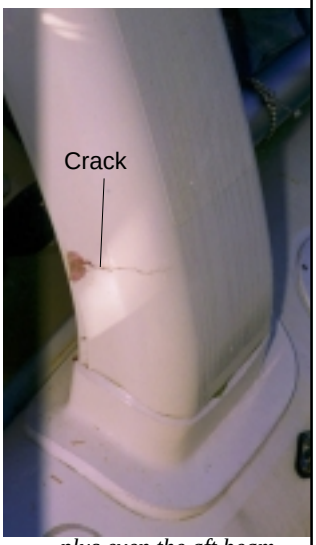
These are formed from top and bottom carbon fiber and fiberglass composite halves which are then bonded together.

They have been very reliable, with many ocean crossings, but there are some areas that need to be checked and monitored regularly as detailed below.

## Always Check Carefully For Collision Damage

*If there is this much bow damage (F-31 float Bow)*


*...then fwd. beam may also be damaged (see crack on fwd. side)*




*...plus even the aft beam (aft side in this case)*

*Collision damage can be serious and beams should always be checked carefully and then monitored after any significant collision. Photos shown damage to an F-31 after a major float bow collision. Both beams were replaced as a precaution.*

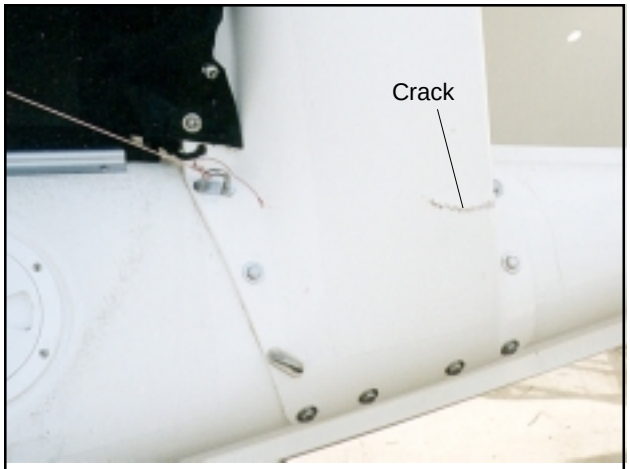
## Collision Cracks

Collision cracks are probably the most common problem and can become a serious hazard if not repaired properly.

Few cars can survive hitting a brick wall, even at low speeds, without serious damage, and similarly few boats can escape significant collisions with docks, heavy metal marker buoys, or other boats, without damage.

Farrier designs are surprisingly tough, particularly float bows, and there can be little or no damage to a bow after a heavy impact, but always check the boat and structure carefully anyway.

Experience from float bow impacts has shown that there are certain areas that should be checked closely. If the impact is severe enough, shock loads can propagate right through the float and beam structure to cause serious unseen damage. Early wood boats are less prone to such damage than fiberglass, but should still checked.




*The beam tops of this F-27 hit a low overhead bridge while being trailered. The crack visible in the top continues around the aft side. Such a crack should not be repaired as the carbon fiber inside is probably considerably weakened. The beam needs to be replaced otherwise it may suddenly fail*

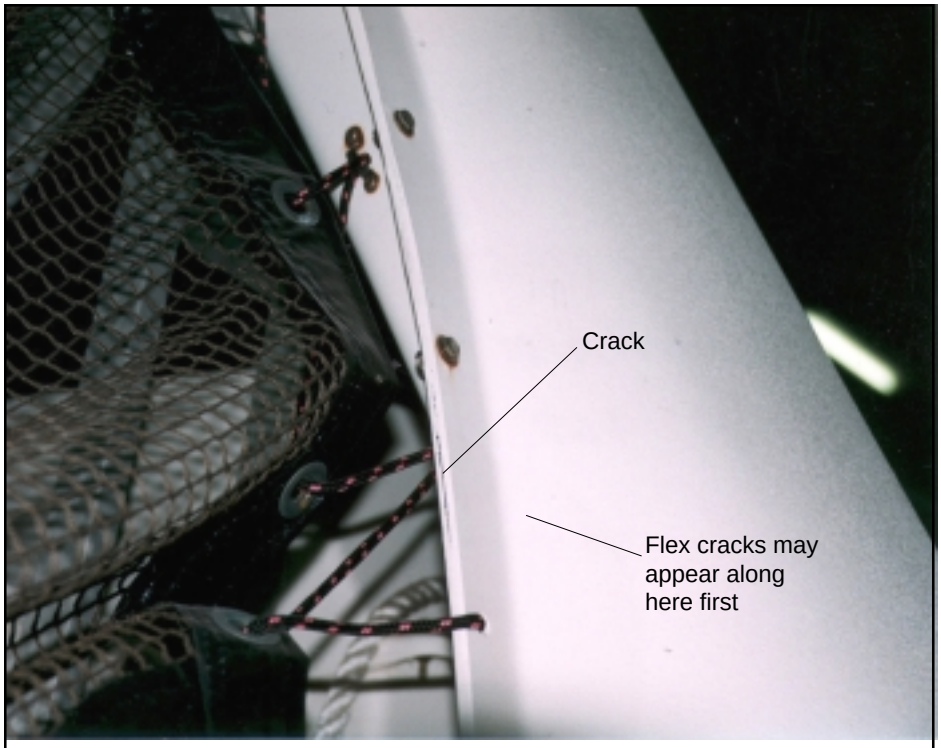
The most likely areas for damage are the beam sides, beam join flanges, folding struts, and the float itself, particularly around hatch openings. In one severe case a float was cracked almost completely around at the aft beam from a float bow collision. So always check very carefully and repair as necessary. If nothing is found, then still continue to monitor for some time as some cracks may take a while to become visible.

On the F-31, after a heavy float bow collision, also check the forward beam bolt pads, and the beam bulkhead to hull taped join. Both can be damaged by the forward beam being forced in and up.

If the folded beams have hit an overhead bridge, then check folding struts (which may be bent), the strut brackets for any sign of cracks or movement, and very carefully **around the beams,** particularly near the float. Any crack running around the actual beam itself should be taken very seriously and may require the complete replacing of the beam to avoid any chance of an unexpected failure later.

## Join Flange Cracks

Production beams are bonded together with an adhesive, and several different types have been used over the years. This includes a highly specialized 'foolproof' epoxy glue developed especially for General Motors to bond fiberglass body panels together, even badly prepared or oily sur-




*This F-27 forward beam has the most commonly seen join flange crack. While not initially serious, such cracks can quickly become serious if not repaired promptly. They should not be allowed to get any worse than this.*

faces, and a special custom formulation made at Corsair. Both of these have tested better than any other glue type on new 'green' moldings and have generally performed very well as required.

However, there are many variables that can affect a glue bond, such as initial preparation, glue mix ratio, and service conditions such as extremes of temperature. Thus few glue joins are 100% reliable and even a single fingerprint on the gluing area prior to assembly can deposit an oily film to eventually start a failure. Extreme temperature changes will also continually work on the join, stresses in the join during sailing can be high, and shock loads from a severe impact can completely delaminate beam flange joins.

To guard against join failures extra machine screws and/or bolts are used through the joins as a back up, but even these can be insufficient if a crack is not noticed and allowed to grow.

Thus all carbon/glass production beams should be regularly visually checked for cracks in the glue joins. Such cracks are not an immediate threat to the beam's integrity as should the glue line on one side of the beam fail, the other side is still strong enough to take normal beam shear loads, but the beam is significantly weakened.

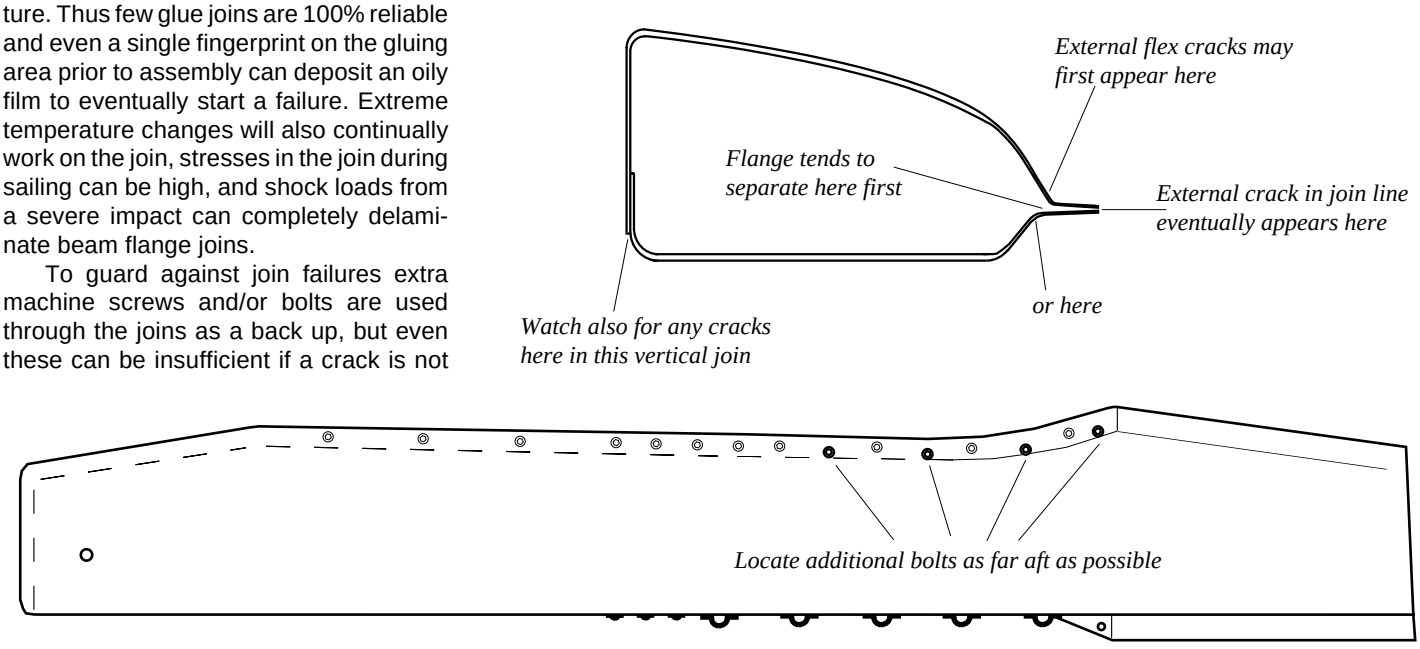
In this regard, break testing has shown that the beam can still withstand up to twice normal sailing loads even after significant glue line cracks have appeared. However, it is still important that such cracks be repaired as soon as possible, as they are a definite weakness that can grow to where the beam may fail without warning.

The most common problem area has been on the horizontal forward flange join on the F-27 forward beams, at the outer end just inside the float. Beam break tests have shown that this area is actually put under a higher stress with more of a peeling load, rather than the usual shear loads, due to the curved beam shape in this area. Such a concentrated and more difficult load is more likely to find any weak areas.

Any failure seems to start at the inside aft edge of the flange, where the stress is highest, and some external flex cracks may first become visible, as per the drawing. The actual glue line crack then slowly makes its way forward to eventually become visible as a crack on the outside.

The vertical join line as used on both sides of the F-25A, F-31 or aft side of the F-27 and F-28 beams, are also areas to watch. Should the glue line fail here, and be undetected, the failure will grow along the join flange until it reaches a bolt, which then acts as a stress raiser. A vertical crack running up the side of the beam may then develop from that bolt. Now it gets serious and must be repaired without delay.

Fortunately, beam glue lines in general have been very reliable and there are




**Best Position for Extra Bolts in F-27 and early F-28 Forward Beams**

*This beam shows a vertical crack that may eventually develop from a vertical flange glue line failure if not seen and repaired early enough - now it becomes more serious*

many hard sailed fifteen year old boats, without back up bolts, that have never shown any sign of a glue line failure.

However, glue lines are just not 100% reliable and are something that need to be checked on a regular basis. Similarly F-24 beam horizontal join flange glue lines should also be checked regularly. Such cracks do not affect amateur built F-9A or F-82 beams as these beams do not have production style glued join seams.

## Prevention

Earlier F-27s did not have many bolts in the forward flanges, it being some time before any glue line cracks were first noticed, and more bolts were then added for extra backup.

As a precaution, additional 1/4" stainless steel bolts can also be added to earlier boats if wished, even if there is no sign of any failure.

As shown in the drawing, these are best located towards the aft side of the flange to counter the tendency of the flange to be peeled apart from the inside out, as shown by testing, particularly at the curved outer ends.

Just drill a 1/4" hole in the correct place and insert bolt, plus washer each side, with some epoxy glue to act as a bedding compound.

## Repair:

Should a crack be found, the repair is relatively easy **if done early**. The crack should be cleaned out by inserting a hacksaw blade or thin knife blade and moving it in and out to remove any loose debris, and roughen both surfaces. If using a knife, warp a strip of emery cloth or sandpaper over the knife. If a long crack, it can be levered apart a little for better access.

Then wedge apart with something like matchsticks and reglue using Lord Chemical's Fusor epoxy 320/322 glue (available from Corsair Marine). This is the special high bond epoxy that can achieve an excellent bond even if surface preparation is poor, or mix ratio is inaccurate. If not available, any good epoxy will do, but prepare well and mix very carefully. Apply glue, using a paddle stick to force it into the join, remove any wedges and then clamp join lightly if necessary (but don't clamp too hard and squeeze all the glue out).

Once cured, the flange should then have additional bolts added as detailed, and again note that these are best located as far aft as possible.

Vertical cracks that have developed from a bolt on the side of a beam are still easily repairable, but procedure is a bit more complex as an additional backing plate has to be fitted inside the beam. Full details are available on request.

## Emergency Repair

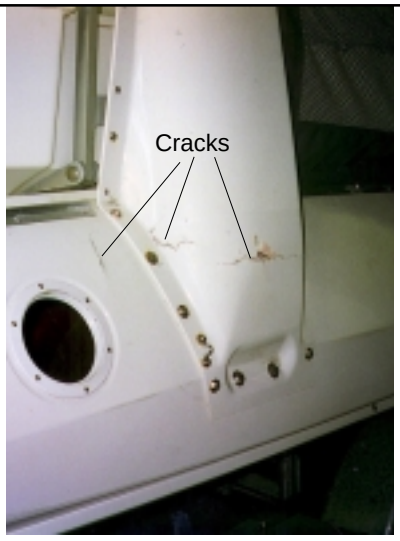
If caught in a remote area, with a beam that has been damaged, then it is possible to make a temporary repair in order to get to where a proper replacement can be made.

In this case, a splint is formed around the beam, using basic fiberglass materials to where the beam is fully encased to at least 12 to 18" each side of the weakened area and making it strong enough for most purposes. It will not look pretty but it will do the job. Full details can be made available if necessary.

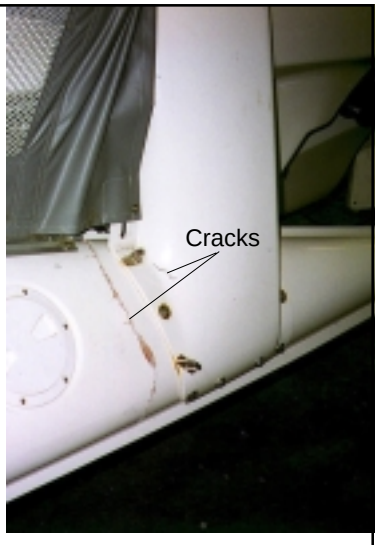
## Other Cracks

It is not unusual to see fine cracks appear in gelcoat particularly at the inner ends of the beams, around the beam bolts, or where the beams bear against the hull.

*Extensive damage to bow can be seen, plus cracks in fwd. beam*




*Close-up of forward beam - this is too damaged to risk repair*




*Aft beam damage - note also large crack running around float deck*

*This F-27 hit a large steel marker buoy at high speed, but still survived. However, note extensive damage to bow, float hull and outer ends of beams. The join flange on the aft side of forward beam was also extensively delaminated and these beams had to be replaced. If such cracks were just gelcoat repaired then there would be a danger of sudden unexpected failure later.*

These are usually only cosmetic, and can even be originally caused while de-molding the part.

Gelcoat is a very hard and brittle material, while a fiberglass laminate can be quite flexible. This flex can be considerable and while it does not harm the laminate it can cause annoying but harmless cracks in the brittle surface gelcoat.

However, if any crack continues to grow, or flexes excessively enough to cause concerns then have the beam or part examined.

## Foam Fill

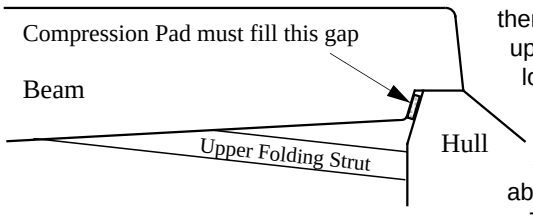
Note that any sponginess or movement underfoot of beam tops should be checked and remedied. This softness can result from voids in the foam fill inside, and such voids were found in some F-27s built from 1992 to 1994 (hull numbers 300 to 420).

Cause was eventually found to be the specified foam filling procedure not being followed. Beam tops should normally feel very solid, and any significant voids will show up as obvious movement under foot. If the voids are large enough, the beam top can flex and buckle, to where cracks or chips start to appear in the top surface, particularly along the beam edges. Such cracks indicate a serious problem, and the boat should not be sailed until the beam has been checked and repaired

Most of these beams have actually now been located and replaced or fixed, but it is still something to watch for. The voids are easily fixed (contact Corsair or your dealer) and this should be done as soon as possible. Once this problem was discovered steps were taken to eliminate any further occurrences, and the foam filling was later eliminated with F-28 beams.

## General Notes

**Compression Pads:** All F-24, F-25, F-82, F-9A and F-31 owners should regularly check that the plastic compression pads on the inner ends of the beams are properly in position and fill the near vertical gap that may exist between the end of the beam and the pads on the hull. If any inwards movement is allowed here, the full compression




load on the beams is directed through the Upper Folding Strut mounting points which are not designed to take this load for long.

The Upper folding strut mounting points can then be damaged. However, although this does not threaten the boat's structural safety, as the beam simply moves in slightly to bear directly on the hull, repairs can be expensive. Note that this gap will vary from boat to boat, and sometimes a compression pad may not be required.

The ideal gap between beam ends and hull pads is from zero to 1/64" (0.4mm), and it should not exceed 1/32" (0.8mm).

**Lubricate Beam Bolts:** Beam bolt threads should be occasionally lubricated with a Teflon grease, to prevent them from galling/seizing in the Bolt Pads. Should galling occur the bolt may freeze in the bolt pad and be virtually impossible to remove. Only solution is to then unbolt the Bolt Pad from inside.

**Always Bolt Beams Down:** Earlier designs up to and including the F-27, could be sailed without bolts in the beams, and it was always fun on F-27 demonstration sails to have someone ask how strong the beam bolts were. The usual answer was to just undo and remove them for a look. However (unfortunately) this should not be done on later designs due to a slightly different (more efficient) folding system geometry.

If bolts are left out, sailing loads can then actually force the inner beam ends upwards slightly, transferring the sailing loads through the Upper Folding Strut, instead of through the compression pads as designed. The Upper Folding Strut mounts may then be damaged as above.

The beam bolts actually still remain structurally of minor importance, their only purpose being to hold the beams down in the correct position, and bearing against the compression pads, but they do have to be there.

*The latest F-28 Fwd. Beam cover which eliminates the forward join flange.*

**Folding Strut Care:** Folding Struts are basically maintenance free, but do need to be checked after any collision for damage.

The glass reinforced acetal bushes between the stainless steel pivot pins and aluminum struts should also be checked occasionally, but wear here has never been a factor or a problem.

Sometimes a bush may crack, and it should then be replaced, but a cracked bush is not serious and does not threaten the boat's structural integrity.

Occasionally also check that the actual stainless steel pivot pin retaining rings or cotter pins are still present.

Cracks may also appear in some folding strut welds, but these again are not structurally important. If all strut welds failed, the worst effect would be flex during folding. The boat can still sail quite safely.

## Latest Developments

To help eliminate any reliance on glue bonds, the forward beam glue flange has now been removed on current F-28s. The join is now covered by an external cover, similar to that used on the aft beams, but with a more streamlined and appealing shape, and extending down to the float.

This can be retrofitted to earlier F-27s if wished, to also eliminate the join flange. It is just a matter of cutting the existing join flange off, filling and grinding the join seam smooth, taping over with glass tape, and then gluing on the new cover/fairing. However, the aft vertical join flanges will still need to be regularly checked.

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