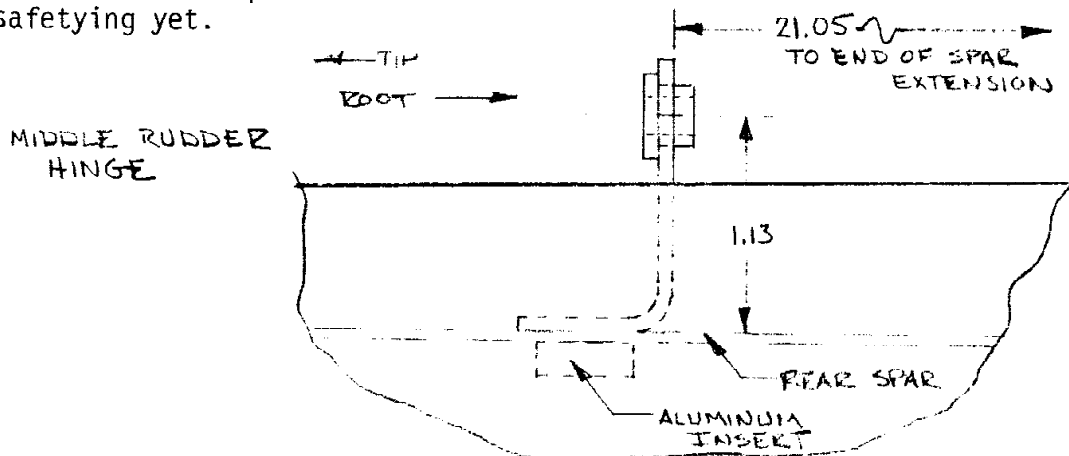
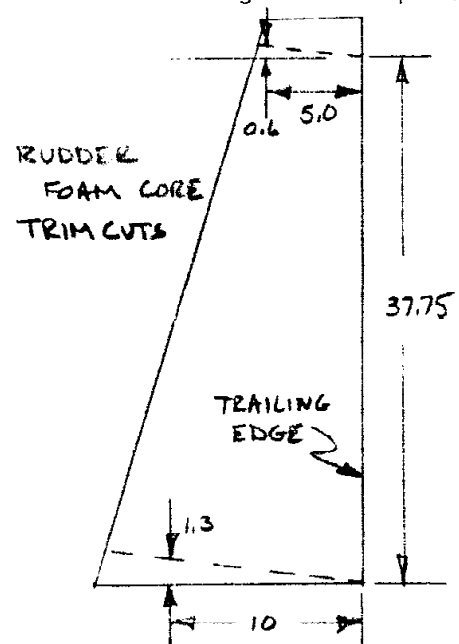
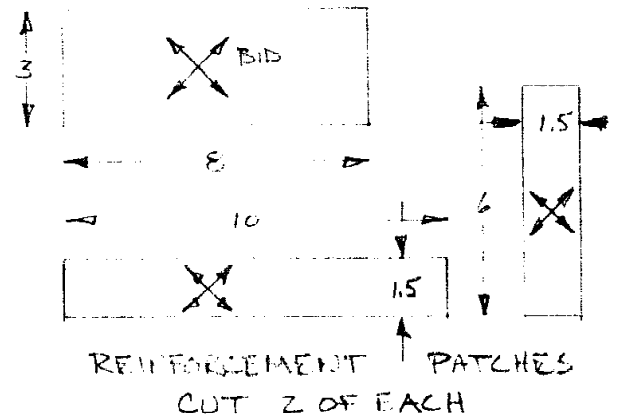
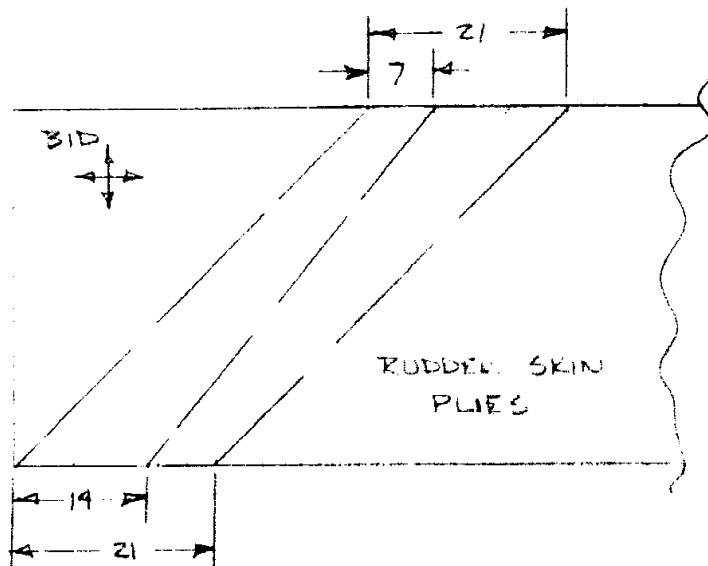


Drag out your alignment string (remember the flap hinges?) string it through the three hinges and stretch it tight between the top and lower hinge centers. Locate the middle hinge in position as shown in the sketch. Shim as required to align the center with the string and bond in place on the stabilizer with 5 min/flox. Let the 5 min cure for 25 minutes or so and then drill the pilot holes through the spar and insert. Size the pilots up to #21 (tap drill for 10-32). Then drill the hinge fitting and spar glass only (not the insert!) up to #11 (3/16). Tap the insert 10-32 UNF and install two AN525-10R-7 screws (5 min/flox on threads to safety). The pilot holes in the top stabilizer hinge can be drilled and tapped 10-32 in similar fashion. Use AN525-10R-8 screws in the tip but don't flox the threads. These screws aren't ready for safetying yet.



Drag out your rudder hot wire templates and the foam block left over from the stabilizer core. Trim the left over as shown in the sketch. Align the templates on each end of the foam block, nail in place, and hot wire cut. Sand off any hot wire defects and fixture the core to your work bench with a couple of small dabs of 5 min/micro. Cut two pieces of 45° BID as shown in the sketch and six reinforcement patches of 45° BID as shown. Cut enough peel ply to cover the entire rudder and 38 inches of 3/4 wide strip for the trailing edge. Make a marker line down the leading edge of the rudder to use as a knife trim reference and tape the area below it to keep the overslop off (standard leading edge treatment).

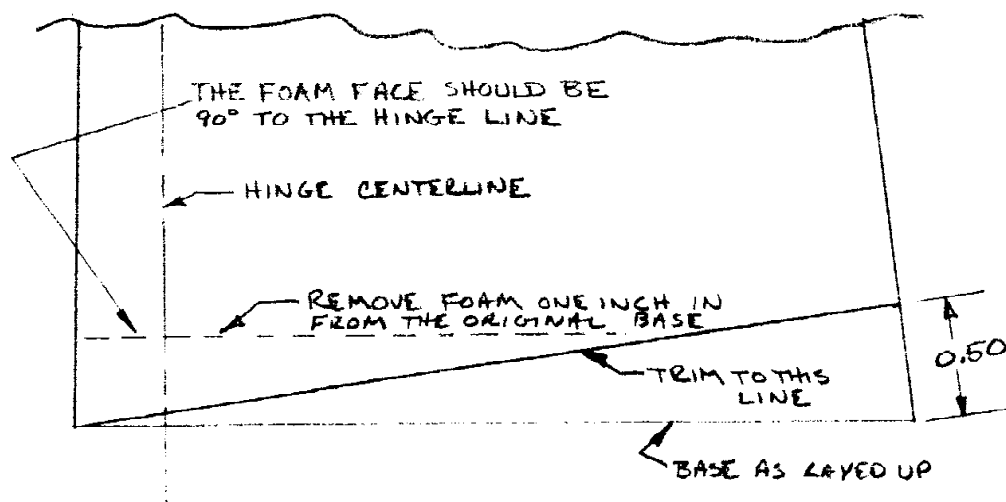




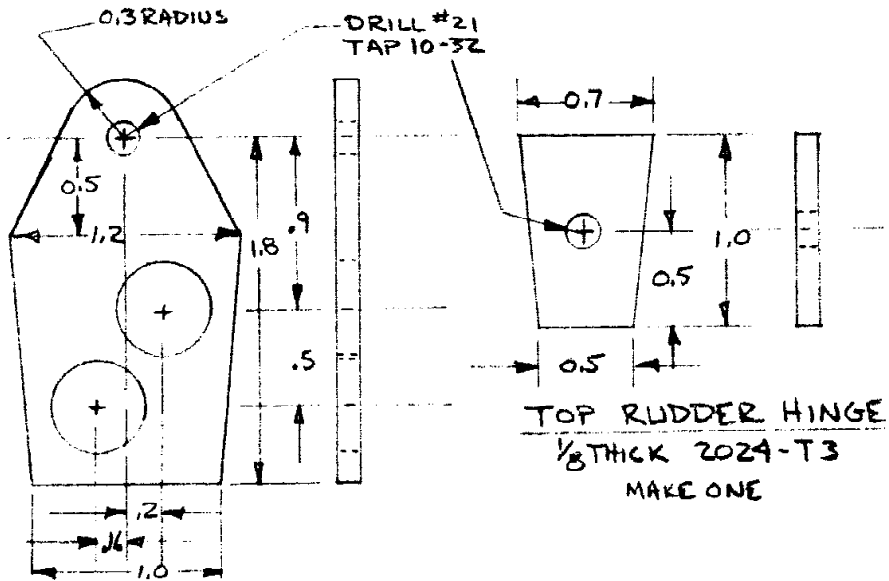
Slurry the foam core, lay the peel ply strips on the trailing edge overlap area, lay up one ply of BID overall, add one 1 1/2 inch wide strip of 45° BID along the root and tip, add one 3 inch wide patch over the middle hinge area, and then peel ply the whole surface. The reinforcement patches extend over the full width (chord) of the rudder. Knife trim and cure 24 hours.

After cure, remove the peel ply and sand the leading edge for a smooth overlap. Pop the rudder loose from the table and remove any 5 min/micro from the foam surface. Carve the trailing edge lump off to expose the glass overlap area. Remove the peel ply strip from the trailing edge and sand the foam to fair into the overlap smoothly. Use the remaining glass cloth to skin the second side exactly as the first side was done and overlapping the leading edge by 1/2 to 3/4 inch. Again peel ply the whole surface, knife trim, and cure 24 hours.

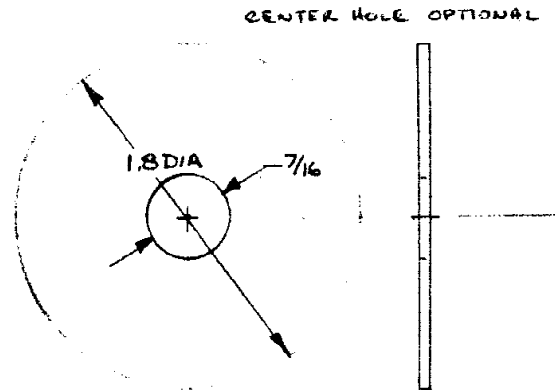
Remove the peel ply and sand any rough or abrupt edges fair and smooth. Try to avoid much sanding on the single ply skins. Trim the base of the rudder as shown in the sketch and route out the foam core to the depth shown. Use a rotary file to prepare the edges for glass bonding on the forward portion and for a flox corner toward the trailing edge.



Make the aluminum rudder hinge hardware and the steel welded belcrank assembly shown below.

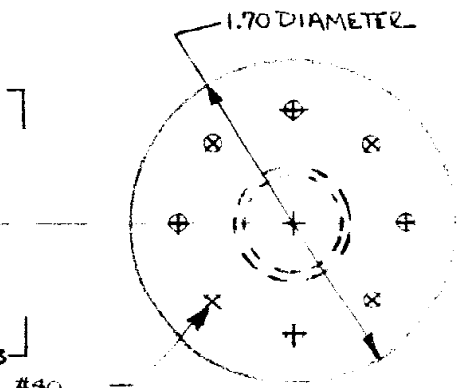
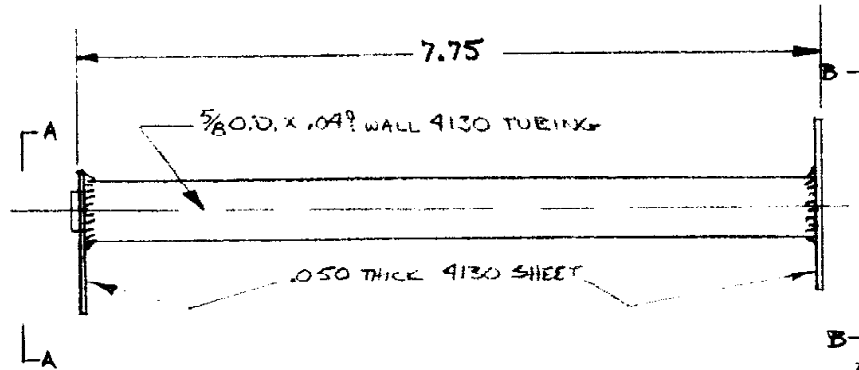


TOP RUDDER HINGE  
1/8 THICK 2024-T3  
MAKE ONE

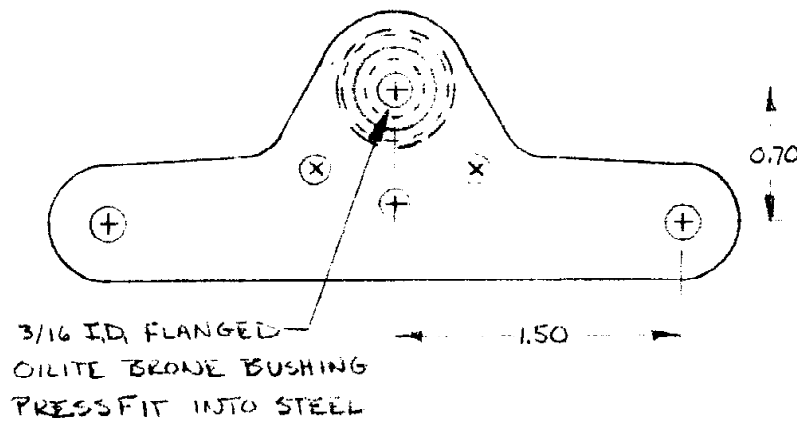


RUDDER BASE INSERT  
.063 2024-T3 ALUMINUM  
OR  
AN970-7 WASHER MAY BE USED  
MAKE ONE

MIDDLE RUDDER HINGE  
1/8 THICK 2024-T3  
MAKE ONE



VIEW B-B  
(FULL SIZE)

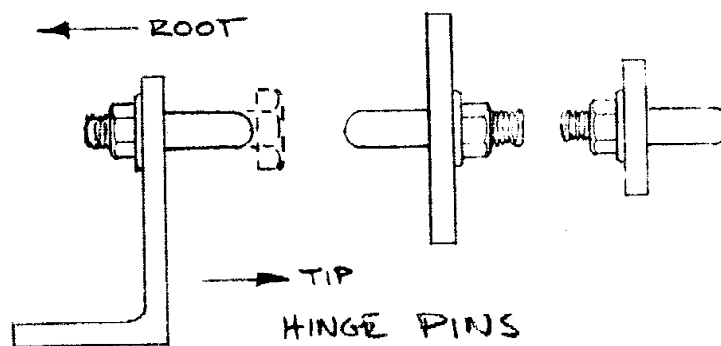


VIEW A-A  
(FULL SIZE)

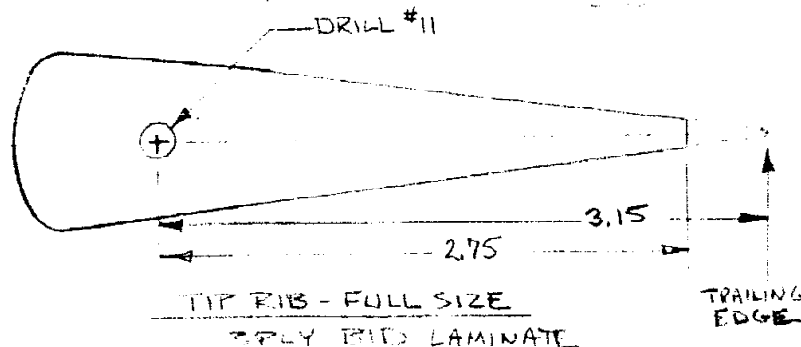
RUDDER BELCRANK ASSY  
MAKE ONE

Now that you have refreshed your metal working memory, drag out the rudder again and go back to plastic work. Locate the rudder base insert centered up in the leading edge of the rudder base. Decrease the insert completely up in the leading edge of the rudder base. Brighten and bond to the foam core with 5 min/micro. Use your scraps of BID and lay up a two ply root rib over the foam, insert, and inside surface of the rudder skins. The glass to glass rib to skin overlap will transition to a simple flox corner type joint toward the trailing edge. Add two additional BID patches over the insert and cure.

Go get three AN3-7A bolts and MS21042-3 or AN365-1032 locknuts. Round up your hacksaw, file, and the three hinge fittings with 10-32 tapped holes. Brighten the two rudder hinges for bonding and try to keep the fingerprints and other contaminants to a minimum. Thread the bolts into the fittings until bottomed tightly against the fittings. Keep the bolt tight in the fitting with one wrench while you tighten a locknut down on the backside of the fitting to jamb the threads tightly. See the sketch for details. Use your hacksaw and file to behead the bolt and round the cut ends slightly.



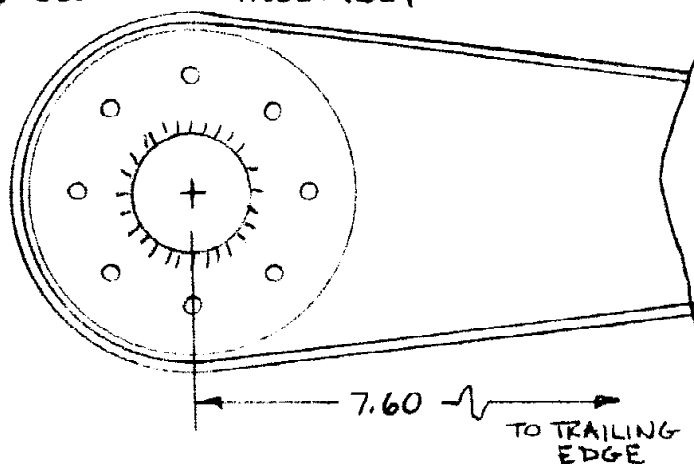
Lay up three plies of 45° BID on a flat surface protected with waxed paper or saran wrap. Use peel ply first, three plies BID, and peel ply last. The prefab glass laminate needs to be 1 1/2 x 4 to allow the rudder tip rib to be cut from it after cure. Cure 24 hours then remove the peel ply from both surfaces and fabricate the tip rib as shown below.



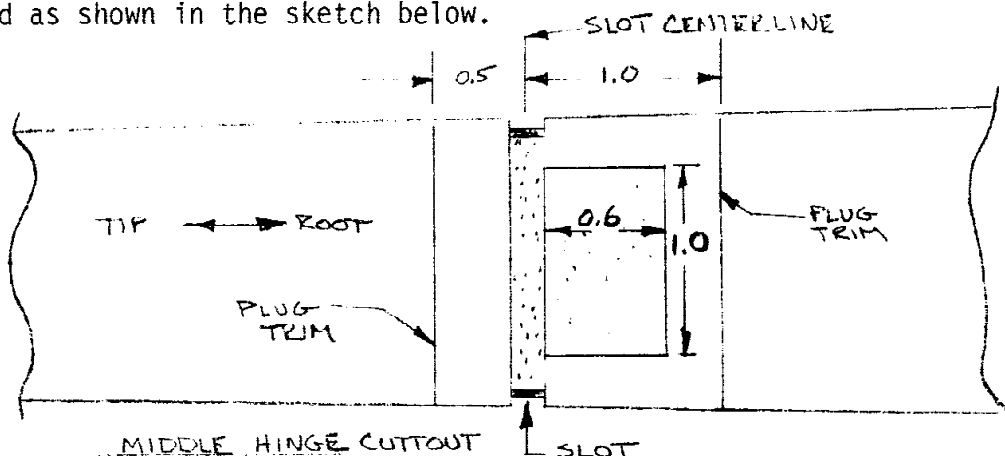
Prepare the rudder tip for a flox corner joint to the prefab rib. Carefully locate the tip rudder hinge plate flush with the rudder tip and with the 3/16 hinge pin sticking straight out. 5 min/flox the hinge in position. Pack the tip with flox and paint the rib with a coat of epoxy. Slip the rib over the hinge pin and seat firmly against the rudder tip. You should get good flox squeezeout to assure yourself of a void free joint. cure.

Go find your long #40 and #30 drill bits and your drill bits and your drill. Locate the rudder belcrank assembly and position it on the rudder base as shown below. Drill four of the eight pilot holes (#40) through the glass rib and insert to cleco the belcrank assembly in position for initial fit checks.

FILE OR SKIND EDGES AS REQUIRED  
TO POSITION BELCRANK ASSEMBLY



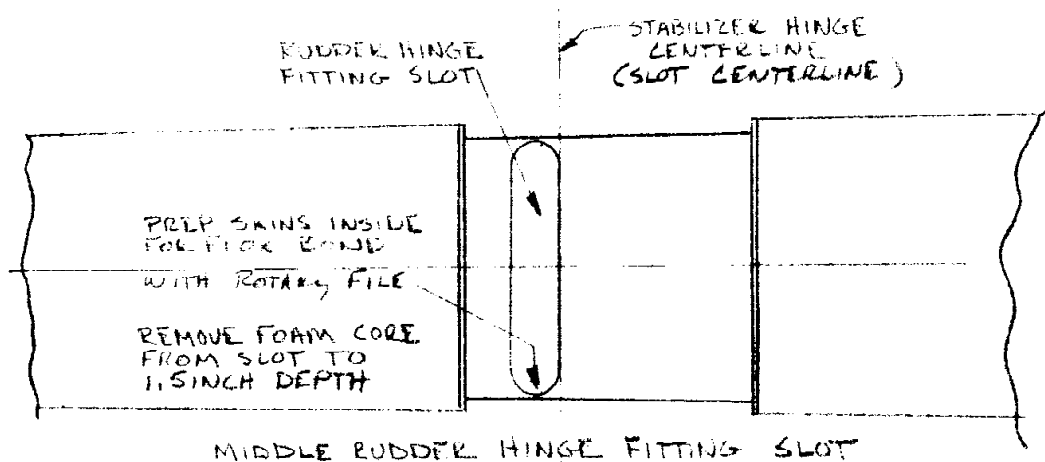
Measure and mark the position of the middle stabilizer hinge on the rudder. Cut a slot in the rudder leading edge which is centered on the stabilizer hinge fitting and 3/16 inch wide. The slot should extend aft 0.8 inches from the extreme forward nose of the rudder. The rudder leading edge skin must be removed as shown in the sketch below.



Next mark the outline of the leading edge plug trim shown in the sketch. Extend the plug trim lines aft 1.4 inches from the leading edge of the rudder. Join the two trim lines to complete the plug's outline on both surfaces of the rudder. Cut the plug out of the leading edge with a coping saw and great care. Save the plug. Use your rotary file (1/4 inch ball end is nice here) to prepare a floss corner with the rudder skins all around the plug cut out. Cut 2 plies of 45° BID 2 x 5 and lay up a 2 ply closeout around the plug cutout. Knife trim and cure.

Remove the foam from inside the plug. After the hinge has been final installed, the skin of the plug will be reinstalled as a fairing over the hinge hardware using 5 min/micro to bond it in place.

After the close out cures, clean up the edges and fit the plug/fairing back in place. Mark the location of the slot on the rudder to use as a reference. Route out a 1/4 inch wide slot in the cutout and rudder foam core as shown in the following sketch.



Slip the rudder hinge into the slot (yes, it is a really loose fit) and assemble the rudder to the stabilizer. Be sure to engage the middle hinge pin in the stabilizer fitting. You can trim the rear spar locally to permit free rudder travel. The rudder should fit passably before bonding the center hinge into the rudder.

Check the rudder alignment around the belcrank assembly and base of the rudder. If the fit of rudder to stabilizer and belcrank to rudder look reasonable, drill the remaining pilot holes into the rudder base and insert, and increase the size of the 8 holes to #30. Cleco in place and fit check again. Thoroughly degrease the steel weldment and use 5 min/flox to bond it to the rudder base. Upset eight pop rivets in the eight holes to attach the belcrank assembly to the rudder before the 5 min/flox cures.

Jig the stabilizer leading edge up with the rudder hanging below it from the bottom and top hinges. Remove the rudder, fill the middle hinge slot with wet flox about 3/4 full. Work the hinge fitting into the slot with a gentle up/down oscillation to purge any air and fill the holes in the fitting with flox. Work the fitting into a reasonable approximation of its final position, clean up any squeeze out, and install the rudder on the stabilizer with the hinge pins fully engaged. Cure 6 hours minimum before removing the rudder. Install the plug/fairing with 5 min/micro. Check travel ( $\pm 30^\circ$ ) and clear the spar if required.