

## Catalina 470

### C470 Association Technical Editor

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Beckoning, #76



### Bow Thruster

"That's cheating"!!! Shortly after I bought BECKONING (C470 hull # 76), I was operating the bow thruster to turn the boat within it's own length while maneuvering in the very close confines of Ego Alley, Annapolis, MD when that statement was directed from the shore at myself and my crew. About 300 people were watching as the boat turned smoothly and we proceeded safely out of what could have been a difficult situation. The bow thruster earned its keep that day and during many subsequent maneuvering situations. The decision to add a thruster was easy...the technical side of a bow thruster is more complex.

For those contemplating a thruster the following three areas are most critical: WHERE the thruster will be placed, what SIZE the thruster will be, HOW

to power it. Which brand to buy and one propeller or two within the thruster tunnel are personal preferences only.

The thruster propeller will reside in a fiberglass tunnel cut through the hull perpendicular to the longitudinal axis of the boat. The motor mechanism itself will be above the tunnel just forward of the seat in the forward shower. There is ample room there for all thrusters of the size and type needed for complete control of the bow of a C470. The tunnel is purchased from the thruster manufacturer because the tunnel diameter is matched to the propeller diameter for maximum efficiency and proper placement of the drive mechanism. The installer (this is NOT a job for an owner!) will cut the hole, place the tunnel, glass it in place and make the installation seaworthy. The placement of the tunnel is critical.

The thruster is used to counteract the side force of the wind applied to the hull. In theory, all side force is concentrated at the center of rotation of the C470. In practice, the bow of a C470 has significant windage since it tops out at about 5 feet above the waterline. The thruster must be able to



C470 Bow thruster installation

counteract (within reasonable limits) the wind force applied to the hull and superstructure of the boat. The thruster tunnel placement must be at the maximum moment-arm distance and

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depth under water possible. Moment-arm is the distance from the center of rotation of the boat to the center of the thruster tunnel. The longer the moment-arm, the more leverage is applied to the longitudinal axis of the boat by the thruster. Consider a teeter-totter...the further from the pivot point a weight exists, the more power that side of the teeter-totter produces. Therefore, the further forward the thruster is installed, the more effective it will be in controlling the bow. On the C470, the proper location places the aft most circumference of the thruster tunnel about 8 - 10" forward of the vertical wall of the forward shower

seat. Even with the thruster in the ideal location, the enormous buoyancy of the C470 requires that weight, in the form of chain for anchors, kelleys, washer/dryer, etc., be added to the bow to keep the entire tunnel underwater in light chop and thus avoid cavitation of the thruster propeller.

The formula which will drive the size of the thruster, both prop diameter and net output, is: wind pressure X wind draft X reduction factor X distance of center of effort to pivot point equals the torque required. This number is further divided by the distance between the center of the bow thruster tunnel and the pivot point of

the boat. What all this means is that bigger IS definitely better. In the case of the C470, a tunnel diameter of 7+ inches and a thruster power of 195 to 225 lbs of thrust is the max, which can be installed in a C470 due to the hull shape. This configuration will allow control of the bow thru 15-20 kts of beam wind if the thruster remains completely submerged.

Thrusters are available in 12v, 24v and hydraulic versions. Due to the 12v configuration of the C470, the available electrical charging systems, and the space available on the boat, I have omitted reference to hydraulic and 24v systems. Aboard BECKONING, the thruster is powered by a series 24 12v starting battery located underneath the forward berth and connected to the charging system via the echo charger. The thruster uses an enormous amount of electricity in a very short period of time but only occasionally, therefore a dedicated deep-cycle battery is not appropriate. Another option is to use the factory-supplied 8D batteries to power the thruster; this option requires very large electrical cables to compensate for the length of cable run but is quick, simple and requires no additional battery purchase or maintenance. The controls available for a thruster vary from a joystick to a touch pad; one should not set up the controls to direct the water flow from the thruster. The goal is to set up the controls in a manner that allows the helmsman to move the bow in the desired direction by moving the thruster control in the same direction!!!

Catalina has made a bow thruster available through the factory or an owner can have one installed after-market. Our C470's performance is impressive; what adds even more to the experience, with the aid of a bow thruster, is elegantly departing and/or arriving when otherwise one might provide the entertainment for those watching from the marina!!!

## SERVICE BULLETIN

DATE: 9 DECEMBER 2005

SERVICE BULLETIN #247

MODELS: UNIVERSAL M25XPB, M25XPBC, M35B, M35BC, M40B

SUBJECT: FUEL FILTER BRACKET #300103

FRACTURES HAVE BEEN REPORTED FROM THE FIELD IN THE AREA OF THE 90-DEGREE BEND IN THE #300103 BRACKET

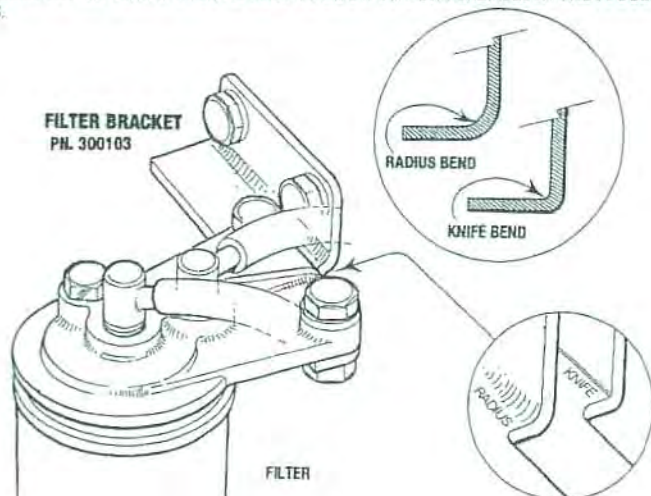
INSPECTION OF BRACKETS RETURNED FROM THE FIELD HAS SHOWN THAT THE 90-DEGREE BEND WAS INCORRECTLY PERFORMED USING A KNIFE-EDGE BENDER RATHER THAN A RADIUS BENDER.

THIS KNIFE EDGE BENDING PROCESS PLACES A NOTICEABLE CREASE ALONG THE BEND, WHICH CAN STRESS THIS AREA OF THE METAL CREATING THE POSSIBILITY OF A FRACTURE TAKING PLACE ALONG THIS CREASE.

THE ABOVE SUBJECT MODELS USING THIS BRACKET MANUFACTURED PRIOR TO SEPTEMBER 2004 (E409) ARE SUSPECT. VISUALLY INSPECT THE BRACKET AND IF A CREASE IS VISIBLE ALONG THE BEND AREA. CONTACT WESTERBEKE CORPORATION AT 508-823-7677. PROVIDE THE ENGINE MODEL AND SERIAL NUMBER AND A SHIPPING ADDRESS AND A REPLACEMENT BRACKET WILL BE SENT AT NO CHARGE.

**NOTE:** TO LOW OF AN ENGINE IDLE SPEED WILL PRODUCE FILTER VIBRATIONS THAT CAN AFFECT THE FILTER BRACKET AND LED TO ITS FRACTURING AT THE 90 DEGREE BEND.

THE ILLUSTRATION BELOW SHOULD HELP TO SHOW THE DIFFERENCES IN THE 90 DEGREE BENDS.



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