

Welcome To
"Safety At Sea"
US Naval Academy
March 2010

**"Damage Control
Tools of the Trade"**

**Please do not use audio or photographic
recording devices during this lecture.**

All photos copyright © 2008 Steve D'Antonio

Presented By:
Steve D'Antonio

President
Steve D'Antonio Marine
Consulting, Inc.

Technical Editor:
PassageMaker Magazine

Contributing Editor:
Professional Boat Builder
Magazine



Common Damage Control Scenarios

- Downflooding: Hull holed at or below the waterline as a **result of collision** with floating or submerged object or **failed below-the-waterline plumbing** (seacock, stuffing box, hose, etc).

- **40% of all underway sinking are result of striking submerged object**
- **16% are a result of broken prop shaft or strut**
- **16% result of damaged or deteriorated below the waterline plumbing**



- Spar collapse: Mast falls as a result of metal fatigue or standing rigging failure.
- Rudder failure or loss.



Unfortunately, not every day at sea is like this...



Some are like this



Others are like this, or worse...



Like this

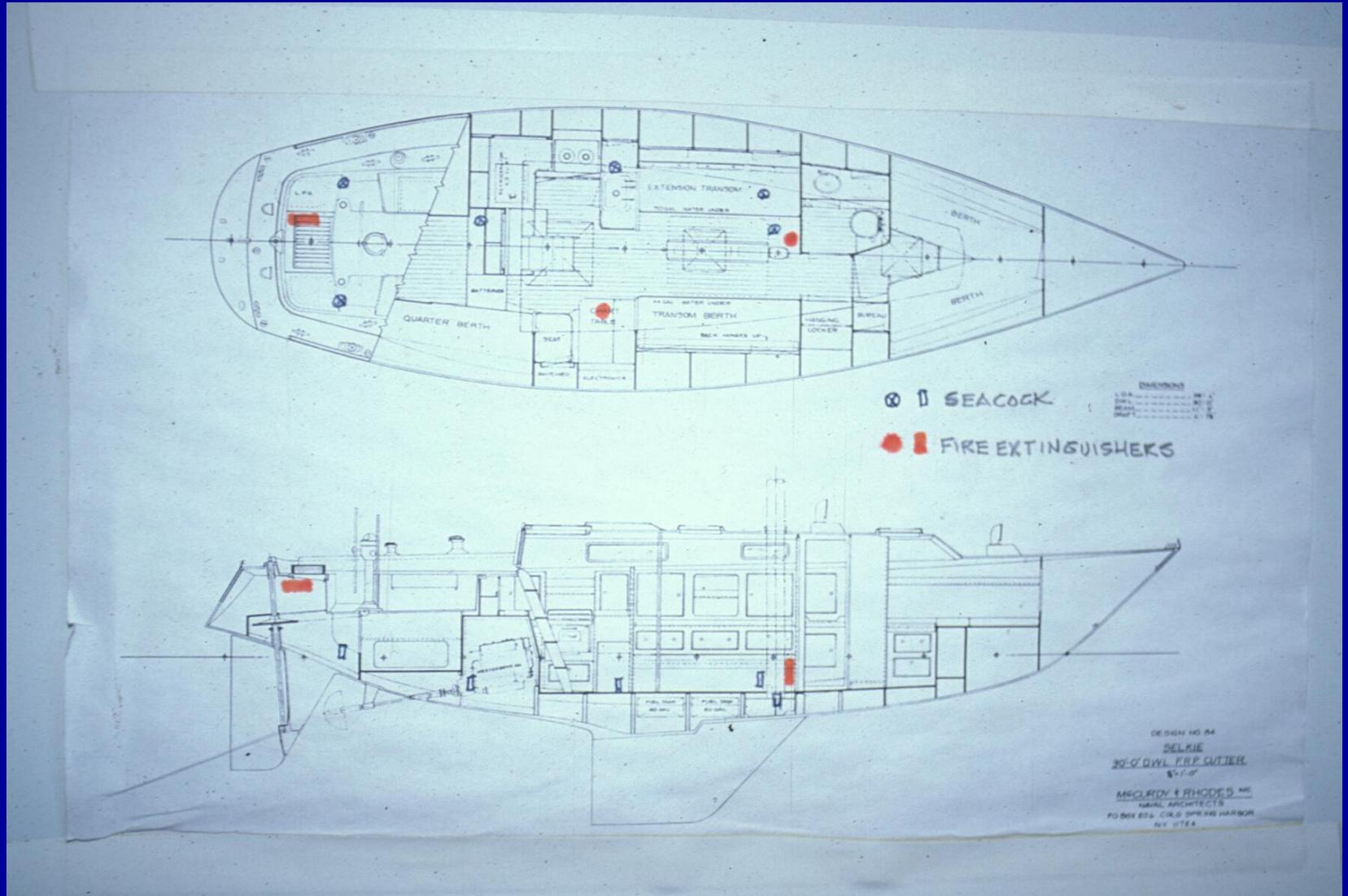


Dealing With Downflooding

- **Find and gain access to the flooding;** stop the water flow *first*, then worry about pumping out.
- **Shut seacocks, fill or patch the leak.**
- **Seacocks. Location, location, location.**



Post a Seacock Location "Map"



Flood Rates

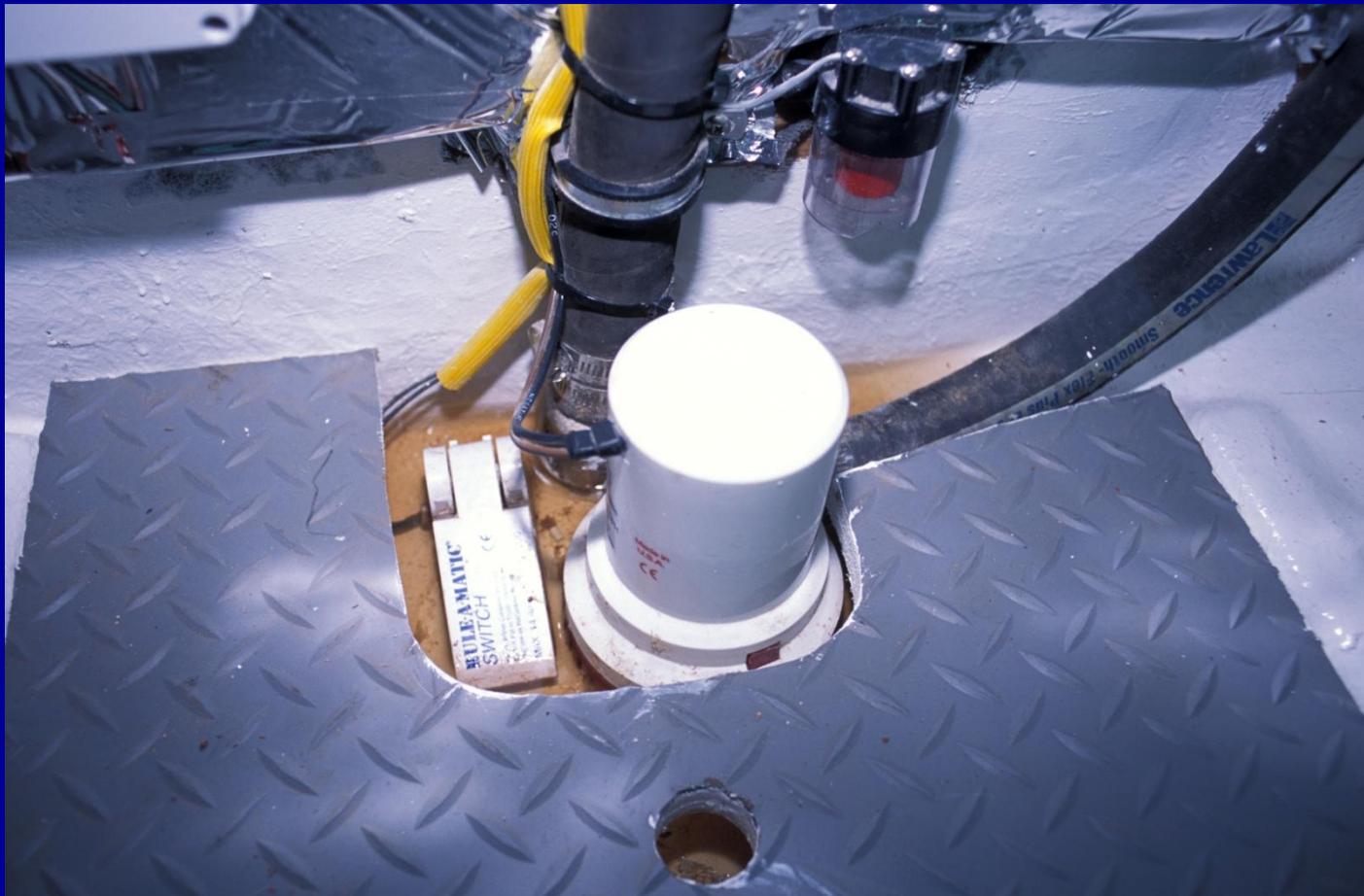
- A 1" hole 1 foot below the water line will admit **20** gallons per minute or **1200** gallons per hour .
- A 2" hole 2 feet below the water line will admit **111** GPM or **6660** GPH.



- ***Larger electric bilge pumps on well-found offshore sailing vessels are typically in the 1500-2000 GPH range, under ideal conditions.***
- ***Actual is often half rated capacity***

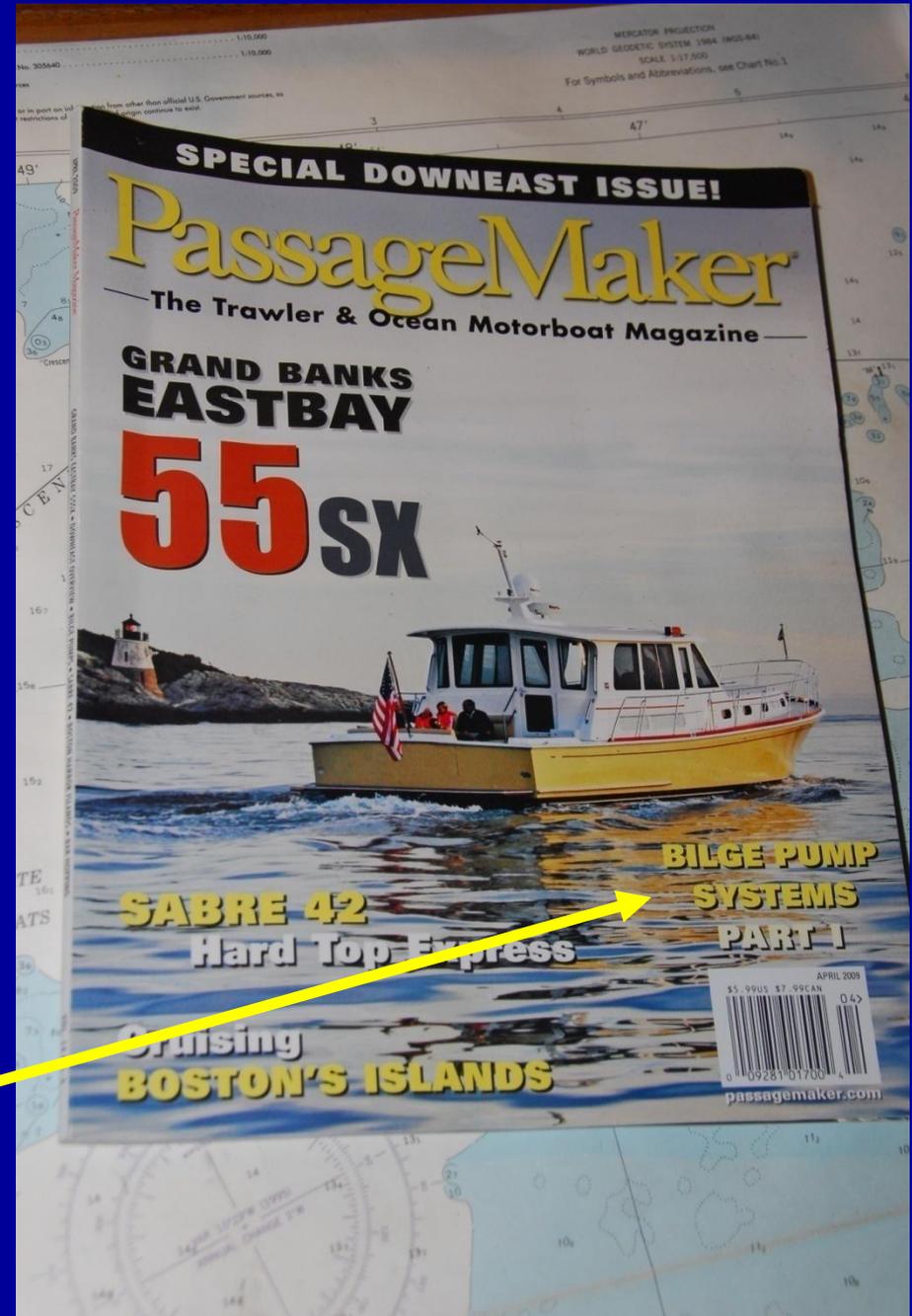


100 gallons/hour for every foot of boat length. 40 foot boat = 4000 gph bilge pump capacity. *Only* submersible pumps have this capacity



April 2009 PassageMaker Magazine

“Bilge Pump Systems Part I”

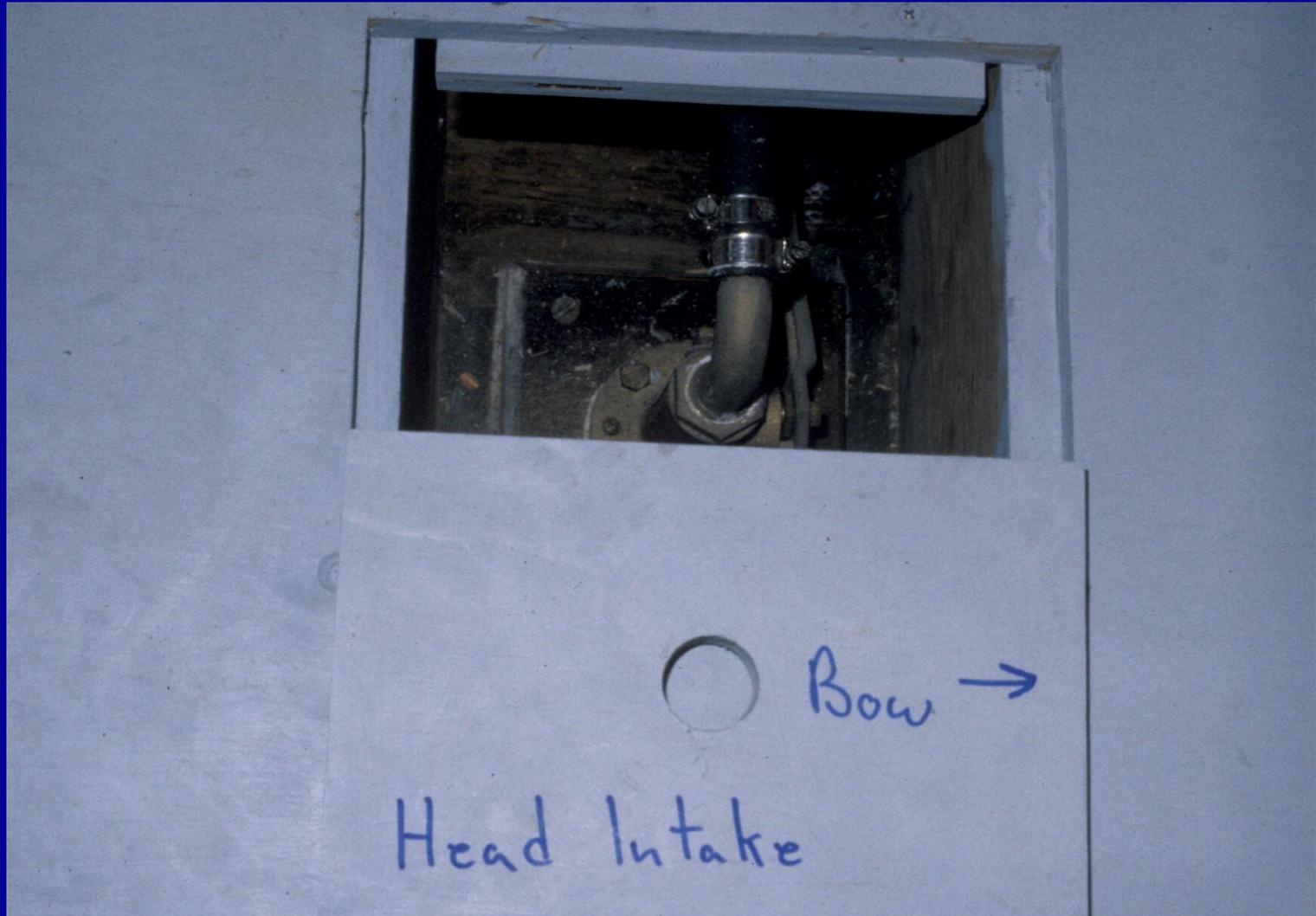


Avoid the “hidden seacock” syndrome

You should be able to find and access every seacock aboard your vessel, *in total darkness, with your eyes closed and without the aid of tools.*

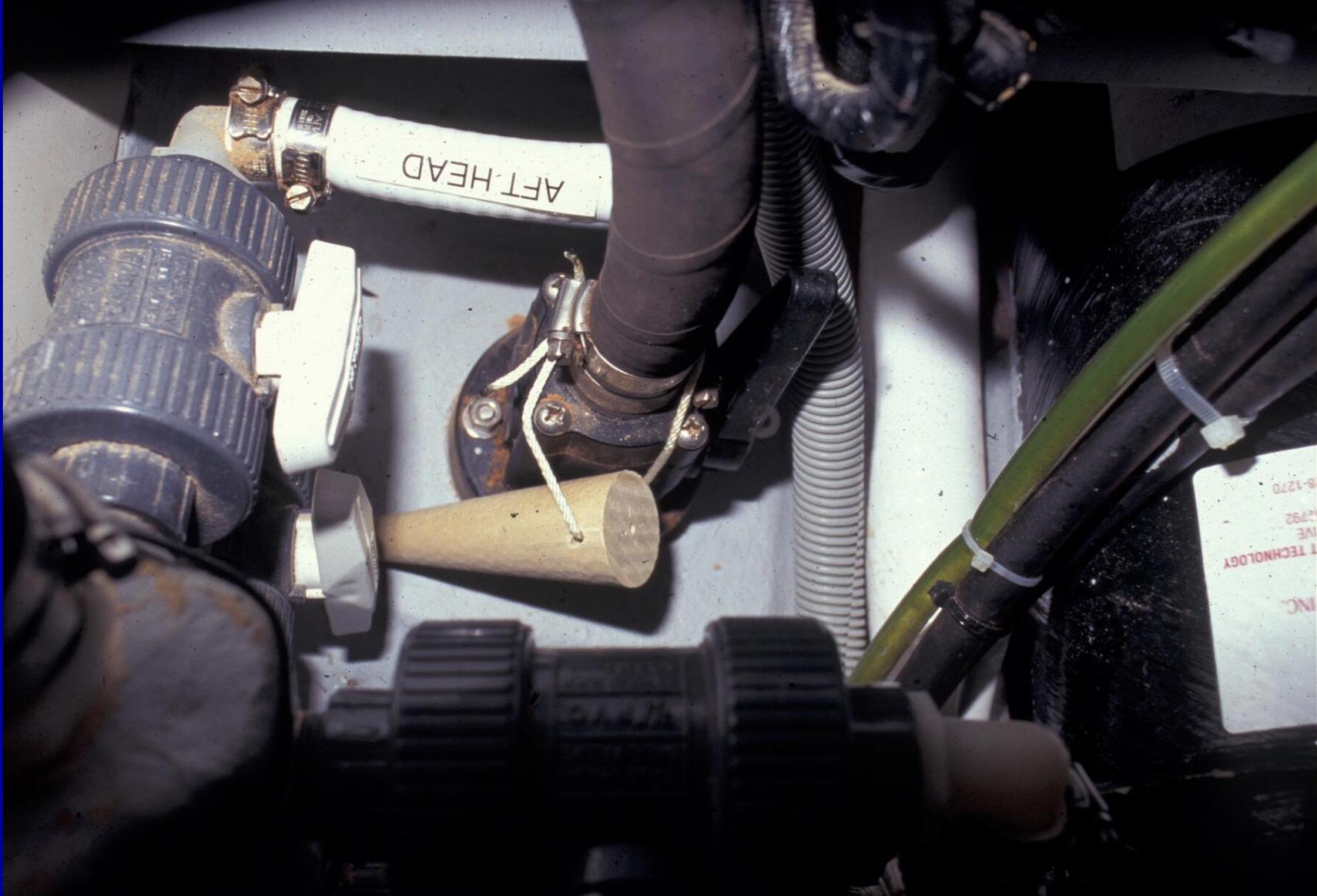


Labeling



Cedar plug assortment





“Leveraging” your seacocks



Seacock Durability and Strength

The 500 lb -30
Second Rule.
Do yours
measure up?



The “Liner” Hull Dilemma



**Access, access,
access.**

Options for
improving access to
the *interior* of the
hull in the event of
damage...



Plan B



- Plan B 2



Cordless reciprocating saw and drill



Spare batteries



Hole-saws



Spare high quality blades



Kindling hatchet

Drill and
sheetrock
screws (not
for thick FRP)



Thin plywood
patches



Sealant



For FRP/Fiberglass

Self Tapping
Screws



Phillips Drive

“Cutting Point” or
PK Screws



Square or Robertson
Drive

Adhesives, Sealants and Cleaners



Two-Part Expanding Foam



If You Can't Access The Damage From The Inside...



Running The Rigging Failure Gauntlet

- Assess damage to the hull quickly.
- Cast off the rig as quickly as possible.
- Save what you can, particularly the boom, for use as a jury rig.



Tools For Dealing With Rig Failure



Hydraulic Rigging Cutter





Adjustable wrench

Channel lock

Bolt cutter

Hacksaw and spare blades

Corrosion inhibitor

Vice-Grips



Sharp
Chisels



Drift
sets



File and comb

A sharp file is like a sharp knife;
indispensable



Clamps
have a
wide
variety of
uses



The Universal Tool



The Original Jury Rig

Be Prepared – Be Creative



Rudder Damage or Loss



Rudder Options





Prepare A Back-Up Rudder In Advance



Damage Control Summary

- Find the leak and fix it without delay.
Keep the pumps clear.



- **Don't succumb to the shock of losing your rig or rudder, or you may succumb to the shock of losing your boat.**
- **Act quickly and calmly to prevent the rig from damaging your (life) boat.**





Thank You

