Rudders and Emergency Steering

This is a collection of slides from various presentations I have made.

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Steering

AVOID USING YOUR EMERGENCY STEERING

- Rudders are the most common problem in Hawaii races.
- Check your primary rudder before you leave.
- If your rudder has not been pulled for inspection in last 3 years, do it now!
Check Primary Rudder before you leave

- Cracks/Corrosion of post at joints and at hull profile
- Cracks crazing in surface of rudder indicate fatigue of blade, possible hidden weakness in post
- Condition of Upper and lower bearings, gudgeons
- Good structural link between hull and deck where upper and lower bearings are mounted
- Pull hard on the rudder in the boatyard. What moves?
Wheel steered boats

• Check the linkage carefully for wear, chafe points, proper adjustment, no wobble.

• Have some serious sailing time on the system before you leave on long voyage to ensure that cable tension is proper and stretch is eliminated.
Steering sheave pin
After the sheave bearings froze
POST TWISTS IN UPPER BEARING MAY CAUSE BINDING IN STEERING OR STRUCTURAL PROBLEMS WHERE BEARING IS MOUNTED AT DECK

GREEN IS UNDEFORMED SHAPE OF HULL AND RUDDER POST WITH RUDDER UNDER NO LOAD.

POST MOVES TO THE SIDE AT TOP OF HOUSING. WILL LOAD STUFFING BOX, CAUSING LEAK OR FAILURE.

RED IS SHAPE OF HULL SECTION AND POST UNDER STEERING LOADS

POST TWISTS IN LOWER BEARING. BEARINGS WILL BIND, UNLESS THEY ARE SELF-ALIGNING.

RUDDER SIDE LOAD BENDS RUDDER POST AND TWISTS STERN

THE RESULT OF INADEQUATE BRACING NEAR THE RUDDER.

BULKHEAD, KNEES, STRUTS---SOME FORM OF BRACING IS REQUIRED TO PREVENT HULL FROM TWISTING.
Problem: Loss of rudder

If this was an arrow, the feathers in are the wrong place.

Get the boat under control. Rig your emergency steering.

A drogue will steady the boat and make it easier to mount the emergency rudder.

When underway again, balance the sail plan & helm. Drogue may help that too.
Emergency Steering

OSR 4.15 basics

- Must have an emergency tiller
- “Alternative methods of steering the yacht in any sea condition in the event of rudder loss.”
- “Must be proven to work.”
Emergency Rudder Links

ANTRIM
http://antrimdesign.com/steering-under-emergency-rudder.html

SCANMAR SOS rudder

Vic Maui

Paul Kamen’s emergency rudder pages
http://www.well.com/~pk/PCrudder.html
http://sfbaysss.net/resource/doc/kamen-emergency-rudder.pdf

Pineapple Sails
http://www.sailmaker.com/articles/e_rudder/

Blue Moment (Rob Macfarlane)
http://www.bluemoment.com/emergencyrudders.html

Singlehanded Sailing Society

Lots of Links
http://cruisenews.net/db/pagetemplate.php?cat_id=18
When you lose your rudder

• “Out of Control” takes on a new meaning.
• Emergency Rudder tests you did at home will not prepare you for this experience! Fin keel boat may spin like a top.
• Deal with problem calmly, crew harnessed to boat.
• Deployment of E.Rudder will be very difficult with boat swinging.
• Drop sails. Raise working jib. Sheet in hard.
• Deploy drogue tied to stern until E.Rudder is fitted.
Steering under EMERGENCY RUDDER

• Forget racing. *Goal is to get to port without breaking the emergency rudder.*
• Reduce steering loads to avoid overloading emergency rudder and tiring the helmsmen
• Moderate speed
  – Steady speed makes steering easier; but avoid high speed surfing, which can overload emergency rudder.
• Balance the sail plan
  – Twin jibs on whisker poles if downwind.
  – Eased mainsheet, or reefed main if excessive weather helm on reaching or upwind course
• Drogue may be useful to make steering easier.
  – Try it if Emergency Rudder is working too hard, steady course is difficult, or sailplan can’t be balanced
Emergency Rudder Options

**Blade style** (looks kind of like a real rudder)
- Custom designed
- Scanmar SOS rudder
- Build it yourself with available guidelines

**Steering Oar**

**Drag device**
- Seabrake or Delta Drogue
- Chain, anchor, and/or annoying crew member hung off spinnaker pole mounted on the transom

Drogue is not the best primary emergency steering device; but is strongly recommended as potential assistance to small blades or oar, for steadying the boat while e-rudder is deployed, and as backup option if e-rudder fails.
Emergency Rudder Pointers

• Think about a system that will be EASY TO DEPLOY with boat moving
  – Daggerboard style with Cassette is good choice

• BUILD IT STRONG
  – Is it at least as strong as your primary rudder?
  – Rudder of correct size from a smaller boat is probably not strong enough; because your boat will be faster and heavier and will generate higher loads.

Rudder serves two functions
1. Directional stability – Pick a course and go in a straight line
2. Steering – Ability to change course
Guidelines for blade style

Emergency Rudder

- Draft half of original rudder
- Area half of original rudder
- Thick foil to keep it strong
- Rough surface finish OK – may help with fat foil
Cassette style easier to deploy

Mount the cassette (better yet have it mounted for the whole voyage.)

Slide the Blade down

Cassette must be very strong!
FOR SMALLER BOATS, DIMENSIONS CAN BE SCALLED BY BOAT LENGTH
DRAFT OF EMERGENCY RUDDER SHOULD BE HALF DRAFT OF PRIMARY RUDDER OR MORE

- Second Carbon Uni
- One Carbon Uni
- Height of Cassette
- Lower Gudgeon Load = 2975 lbs
- Upper Gudgeon Load = 1360 lbs

Cover foam with one "Knytex Pro-Mat" CDM-1808
Add two layers Carbon Uni QA-C90 as shown
Cover with one more CDM-1808

Foam is Lasta-Foam 7110 or equivalent
Use epoxy resin
This layup only valid for 2% thick foil, NACA 0020
Rough outside surface is ok
Tape leading and trailing edges for good bond

Typical Emergency Rudder Blade
For boats up to 35' long

Antrim Associates, Naval Architects
140 Archery Way, El Segundo, CA 90245 (310) 373-8660
Scale: 1:18 1.5 = 1' FEB 20, 2004 JKA
**SCANMAR SOS Rudder™**

**NEW**

**Buy It, Mount It, Store It... And hope you never have to use it!**

Most modern sailboats have unprotected spade rudders. These designs have dramatically increased the chance of loosing the boat’s rudder. If you carry a life raft, shouldn’t you also have an emergency rudder system?

**The SCANMAR SOS Rudder™ is designed for:**

- **A.** The racing sailor who has to satisfy the racing rules which protect both lives and boat.
  
  "crews must be aware of alternative methods of steering the yacht in any sea condition in the event of rudder loss. At least one method must have been proven to work on board the yacht. An inspector may require that this method be demonstrated."

  ORC safety recommendations for offshore sailing, paragraphs 4.14 Emergency Steering

- **B.** The cruising skipper who has no windvane that can be used as a backup rudder.
  
  "We've all seen articles about how to rig jury steering with floorboards lashed to the end of running booms and such like, but in reality it is very difficult indeed to make these last-ups work even half efficiently..."

  Geoff Pick in his book, Blue Water Countdown

**LIST PRICE**

- Standard $2,295.00
- Large Model $2,495.00

- Designed to steer a boat up to 50 ft LOA. Rudder successfully tested in Around Alone for 2000 nm.
- Custom designed mounting system for your boat
- All 316L stainless steel rudder and mounting hardware
- Average weight 55 lbs. (16 kg.)
- All components store easily below deck
- Only four small brackets permanently mounted on boat

The orange bag for the
SOS rudder contains all the mounting tubes, rudder and hardware.

Only four mounting brackets are left on the boat.

Average space needed for the bag: 48" x 18" x 6"

**SCANMAR INTERNATIONAL** is the world’s leading windvane manufacturer.

For 25 years we have done installation drawings for our windvanes. Most boats are already on file. When you order a SOS rudder you are using our experience and expertise. The custom made mounting system and detailed instructions will make it easy to install.

Once mounted and tested it goes back in the bag.

(SCANMAR INTERNATIONAL)

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"The SOS Rudder is a device so simple and so obvious that it's a wonder no one has built and marketed this clever gadget before."

Blue Water Sailing
September 2000

Close-up showing stainless steel castings

**SOS Rudder installation on a Beneteau 42**
Steering Oar  
(viable for small, light boats only)

With open transom, pivot point is just a lashing between padeyes on opposite sides of the cockpit. No hard contact.

Removable blade

Spare bowsprit

Emergency steering Oar for Antrim 27 "E.T."
PARA-TECH®

http://www.seaanchor.com/

DELTA
Drogue

Jordan series drogue

www.seabrake.com/

http://www.jordanseriesdrogue.com/
http://www.seriesdrogue.com/

http://www.hathaways.com/galerider/

http://www.paraanchor.com/

Seabrake

Galerider
Steering with a drogue

Steering with a bridle to the drogue.

One side of bridle is fixed. Boat is steered by trimming the length of the other bridle leg.