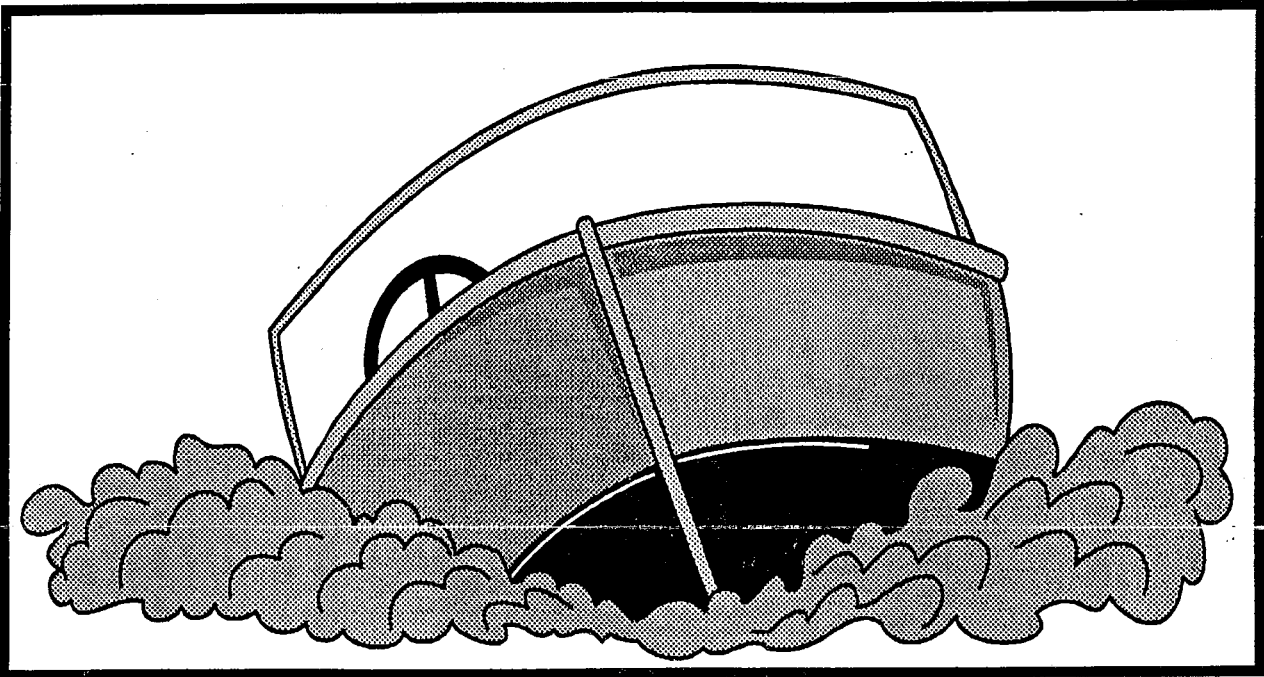


FACILITATORS OUTLINE FOR THE

COXSWAIN'S GUIDE
TO BASIC STABILITY



This material is used during the TCT presentation of the SEA KING case study, and follows the class discussion of the case. It starts with a viewing of about 20 minutes from a two hour tape made of the incident, taken by someone who was on the 47 foot MLB. Student's attention is directed to the action of the SEA KING in the water, especially as compared to that of the IRIS and the 47 foot MLB. The concepts of "wave period" and "rolling period" are also presented. About two minutes before the SEA KING lists to port and then capsizes with a loss of three lives, someone is heard on the radio reporting to the Station - "*everything out here is looking good!*" - A discussion of SITUATIONAL AWARENESS ensues.

2. **NEUTRAL:** (Illustrated by a plug lying on its side.)
When rolled around the table top, this plug will come to rest at any point, usually the last one caused by what ever force was causing it to move.

3. **UNSTABLE:** (Illustrated by a plug standing on its small end.)
With any slight inclination caused by an external force, the plug will "capsize," coming to rest in a more stable position - usually on its side. (The point is made that while it is probably okay for a plug to come to rest on its side, it is an unsatisfactory outcome for a vessel!)

WHAT IS THE PRACTICAL MEANING OF STABILITY WHEN APPLIED TO VESSELS?

For a vessel, stability is the ability of a vessel to right itself after a roll. When a vessel rolls, it can do one of three things:

1. **STABLE:** It can return to its original upright position.
2. **NEUTRAL:** It can remain in whatever position it was pushed by the waves and/or wind.
3. **UNSTABLE:** It can capsize, and come to rest in a new position.

Most vessels that get in trouble go from **STABLE**, where there is a tendency to return to upright, to **NEUTRAL**, where there is no tendency to go back to upright. If in the **NEUTRAL** position water can enter the vessel, it will then sink, many times without actually capsizing. (The **TITANIC** never capsized.)

A practical method of keeping out of trouble is to watch the period, or time require for a vessel to make a complete roll from side to side. The period should remain about the same regardless of the size of the roll. If the period increases appreciably, or if the vessel appears to hesitate at the end of a roll before coming back, she is approaching **NEUTRAL** stability, and immediate steps must be taken to control the situation.

(At this point we look again at the tape of the **Sea King** just before she listed to port, took on water, and sank. While the **IRIS** and the **47** are bobbing about in reaction to the large seas, the **Sea King** is barely moving in the water. The rolling period has significantly increased, and she is very slow to start back up from her rolls. Finally, she comes to rest with her port quarter under water. She does not actually capsize for another four or five minutes.)

HOW DOES THE WAY A VESSEL ROLLS INDICATE STABILITY?

If a vessel's weight is concentrated low, she will roll quickly and have a strong tendency to return quickly to her original upright position. Such a vessel is said to be "stiff."

A vessel loaded with the weight up high will be top-heavy, and have a slow and weak tendency to return to her original upright position. She is said to be "tender" or "cranky." Such a vessel rolls sluggishly, and has poor stability and can capsize without warning as a result of unexpectedly high waves, heavy weather or relatively slight flooding. Such vessels have a small margin of safety in case of damage or shifting weight. Many commercial fishing vessels are top-heavy because their owners put the large trawling equipment up high to get it off the deck, out of the way of the fishermen. Some of them are "stability-time-bombs" even without any damage.

WHAT IS SYNCHRONOUS ROLLING AND WHY IS IT SO DANGEROUS?

The length of time it takes a vessel to make a complete roll (i.e. from port to starboard and back again) is its "rolling period." When inclined in still waters, this is known as the "natural rolling period" and is a characteristic of each vessel.

When a vessel is at sea and under the influence of waves and wind, this action is referred to as the "apparent rolling period." As a vessel approaches NEUTRAL stability, its "apparent rolling period" and that of the waves become the same, because the vessel is without any force to right itself. This is known as "synchronous rolling" and can lead to rapid capsizing. Immediate action is necessary. The quickest response is to change course and/or speed. If time permits, you can improve stability by dewatering, shifting cargo, etc. The first thought that should go through your mind when you observe "synchronous rolling" is

IS IT TIME TO GET EVERYBODY OFF ?

(This material was prepared in June of 1996 by TCT Facilitator Dr. John C. Gibson, USCG Auxiliary, and is based on information contained in *Practical Stability (STAB) From Limited Master Mate & Op.*, published by Marine Education Textbooks - Houma, LA.)