

U.S. Department
of Transportation

United States
Coast Guard



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MEMORANDUM

From: [REDACTED] LCDR
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Reply to
Attn of:

To: PACAREA (pofm)

Subj: RB-HS SAFE SPEED TEST

1. **SUMMARY:** Following a unit Class C Boat Mishap, my Operations Officer, LT [REDACTED] and Boat Division Chief, BMC [REDACTED] conducted a series of tests aboard the 25 ft RB-HS manufactured by SAFE BOATS INTL. The primary objective of the operational testing was to determine safe limitations while maneuvering tactically (i.e. J-turns/power turns) with people on deck manning weapons. Additionally, we wanted to establish proper precautions for boat crew personnel to take during training evolutions and incorporate these into the unit Navigation Standards and Commanding Officer's Standing Orders. The test was conducted within the Port of Los Angeles on 05 Nov 02 using the 255016 and 255017 with 60 cal guns mounted. A three-person boat crew was onboard during the testing as well as a cameraman from public affairs staff.

2. **OBJECTIVES:** To determine parameters for safe speeds and proper safety precautions during tactical maneuvers with personnel inside the cabin, outside on deck, and manning weapons at battle stations to prevent unnecessary mishaps while training.

3. **PREPARATIONS:** Cameras were mounted on the stern gun mount looking forward and inside the cabin looking aft. A cameraman was positioned on the second boat to film stress on the test boat and crew during the high-speed maneuvers. Crew and participants were given a pre-underway brief and all personnel wore appropriate safety gear including helmets and safety belts which were clipped into the bolted rings at the fore and aft gun mounts.

4. **PARAMETERS:** The test boat conducted J turns and power turns at varying speeds, starting at 2000 rpm and increasing 500 rpm for each maneuver to a maximum of 5800 rpms. A J-turn is a hard and sudden turn to stbd or port in which the boat turns to a reciprocal course in very fast manner. Normally the throttles are not adjusted during the turn. A power turn is a similar turn except the throttles are reduced as the boat is heading into the turn and then the throttles are thrown ahead to "power out of the turn". A power turn usually results in a tighter turning radius than a J turn. The end result of the maneuver is similar and ends with the vessel heading on a reciprocal course.

5. **RESULTS:** The testing was conducted in calm or near calm conditions inside the breakwater in Los Angeles Harbor. At 2000 rpm the g-force and stress on the crew was non-existent. This stayed at this level or increased slightly until the 3500-rpm range. At 3500 rpm's there was a noticeable g-force increase and significant increase in the stress on the personnel on deck. At 4000 rpm there was an even greater increase in the stress

on the personnel at deck. At 4500 rpm there was a major increase in the pitch, yaw and turn rate causing a major increase in the g-force stress on the persons on the boat, Specifically on the stern deck of the boat. It was evident that each 500-rpm increase from 3500 rpms resulted in an exponential (vice linear) increase in the g-forces and stress on the personnel in the boat. The greatest change of g force, from slight to moderate is from 4000 rpm to 4500 rpm's. The stress and forces make a large jump on this increase of speed. This is due to the boat being on plane which will dig the stern chine, on the inside of the direction of turn, causing a power inertia transfer of the pivot point of the boat forward toward the bow. This also causes the boat to heel radically to the inside of the turn. With all these forces in play, the person on the bow gun is least affected, as that is closer to the pivot point. However, the person on the stern deck of the boat will suffer the worst effects, due to a whiplash action, due to being farther away from the pivot point and angle of heel. Prior to conducting maneuvers at 5000 rpms, the crew was brought inside the boat cabin. At 5000, 5500 and 5800 rpm's, the g-force affect was such that a person on deck would have a very hard time holding on, and the possibility of ejection is great. A videotape is provided as enclosure (1) that shows the effects of these maneuvers at the different speeds.

6. LESSONS LEARNED: Because these boats are high powered and highly maneuverable with a tight turning radius, the g force effects on the boat crew apparently increase in an exponential fashion as the rpms increase over 3500. In the interest of creating a safe training environment, I have limited rpms to 3500 with personnel on deck during boat crew and coxswain training evolutions. Should the coxswain's wish to exceed these rpm's, the boat crewman must wear safety belts and helmets and be clipped into the boat. Over 4500 rpm's, I have mandated that all personnel be inside the cabin during training maneuvers.

7. RECOMMENDATIONS FOR ADDITIONS AND MODIFICATIONS:

a.

[REDACTED]

b.

[REDACTED]

d.

[REDACTED]

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Encl: Video Tape of RB-HS Test