

SUPSALV Performs Stern Tube Bearing Replacement on USS GEORGE H. W. BUSH (CVN 77) in Norfolk, VA.

4 January 2013

The Underwater Ship Husbandry division (NAVSEA 00C5) of the Office of Director of Ocean Engineering, Supervisor of Salvage and Diving (SUPSALV) is tasked with developing procedures for repairing U.S. Navy ships that would otherwise require dry-docking to repair. This past December, they took on the in-water replacement of the aft stern tube bearing on # 1 shaft on USS GEORGE H. W. BUSH (CVN 77) at Naval Station, Norfolk. After discovering damage to USS GEORGE H. W. BUSH stern tube bearing during a cleaning and video inspection conducted by NNSY divers, NAVSEA was called to replace the failed bearing. GEORGE H. W. BUSH had just completed a Planned Incremental Availability (PIA) at NNSY but logistical challenges associated with this bearing replacement, the first waterborne stern tube bearing replacement for CVN class ever conducted, necessitated scheduling the challenging diving job after the PIA completed.

NAVSEA 00C representative and divers from Phoenix International, SUPSALV's Diving Services contractor, arrived on scene on 5 December and positioned the rigging barge with its A-Frame handling system astern for managing the heavy loads associated with this task. An image of the diving and rigging barge is shown below. Note the A-Frame handling system and hydraulic tuggers which were installed on the barge to aid the divers in handling heavy equipment in the water and under the ship.



Diving and rigging barge used to conduct stern tube bearing replacement. Note A-Frame handling system with hydraulic winch system (tugger) on the right side of the picture. SUPSALV van on left provides critical gear like bearing removal platform, hydraulic jacks, and A-Frame and winch system to support this repair procedure. In front of the van is the stern tube fairwater which covers the bearing. It has been removed to the barge for refurbishment.



With a Phoenix diver watching from the water, the repair crew pulls one-half of the stern tube bearing clear from the water at the starboard side of the USS GEORGE H. W. BUSH using A-Frames (blue structure) and hydraulic tuggers (not visible).



A portable crane is used to move bottom bearing shell from the dive and rigging barge to the pier.

Diving tasks commenced including removal of the fairwater and stern tube access cover. Lifting pad

eyes were welded to the hull and the fairwater plate was removed and rigged to the barge. Bearing studs were removed and the top bearing shell was partially jacked out and secured in position.

To jack out the bottom half of the bearing, the shaft had to be lifted. A bearing removal platform, which is an I-beam assembly constructed to hold the bearing halves safely while being jacked out, and a set of powerful hydraulic jacks were used. After 8000 psi was applied to the jacks, the shaft lifted approximately 1/8" easing the load off the lower half of the bearing. Then, on 13 December, jack-out bolts were used to slide the bearing half onto the bearing removal platform from where it was removed and placed on the barge. Damage to the bearing stave surface is evident in the following picture.



Damaged staves are visible on the bottom half of the stern tube bearing. This bearing is resting on the dive and rigging barge prior to being transferred to NNSY's bearing shop.

On December 14th, the top half of the bearing was jacked back into the bearing shell to ensure positive control during rotation. It was then rotated to the bottom position and jacked out and removed. Both halves were sent to NNSY bearing shop for cleaning, restaving, dressing, and measuring. SUPSALV received both bearings back from the repair shop in ready for issue (RFI) status on 17 December. Re-installation began immediately and the bearing replacement and fairwater reassemble tasks were completed on 27 December, 2012 returning the ship to service.