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A NEW, STATE-OF-THE ART
SUBMERSIBLE SUPPORT SHIP

by
R.W. Cook, R.S. Jones and
J.R. Prentice

Harbor Branch Foundation, Inc.
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R.W. Cook, R.S. Jones and J.R. Prentice
Harbor Branch Foundation, Inc.
RR 1, Box 196
Fort Pierce, Florida 33450

Abstract

Harbor Branch Foundation, Inc. of Ft. Pierce Florida has completed a new oceanographic and research submersible support ship. The not-for-profit organization's vessel is one-of-a-kind among the oceanographic fleets of the world. This 176' ship will handle both of the Harbor Branch JOHNSON-SEA-LINK class manned submersibles. R/V SEWARD JOHNSON has accommodations for 30 and a range of 8000 nm. She is capable of global operations.

Introduction

The Harbor Branch Foundation has introduced a brand new oceanographic research ship to the nation's fleet. The vessel was designed from the keel up as an oceanographic ship with her specialty being support of the Foundation's two 4-person research submersibles (JOHNSON-SEA-LINK I & II).

Harbor Branch is a not-for-profit organization dedicated to oceanographic research. The Foundation represents a unique alliance of marine operations, ocean engineering and marine sciences. Although Harbor Branch is

also involved in classic forms of ocean research, it specializes in the operation of manned submersibles used in support of scientists. Harbor Branch engineers provide many of the unique tools used with these undersea vehicles and the Foundation's marine operations personnel see to the maintenance and operation of ships and submersibles for user scientists.

Harbor Branch has accumulated over 10 years of experience in operating the JOHNSON-SEA-LINK class research submersibles from its other submersible support ships, R/V JOHNSON and R/V SEA DIVER. This experience has been drawn upon heavily in design of the Foundation's new vessel, R/V SEWARD JOHNSON.

Harbor Branch has received excellent service from its other ships, but wished to add greater range, berthing space, lab space and the reserve stability needed to add more research equipment. These two ships both use a very efficient, articulating "hydrocrane" for launch and recovery of the submersibles. However, that system is sea state limited and marine operations personnel felt that a North Sea type A-frame would provide a larger weather window for submersible operations.

The ship, as was its predecessor, is named for Harbor Branch co-founder, J. Seward Johnson, a Johnson & Johnson pharmaceutical heir. She symbolizes his dedication, along with that of Harbor Branch co-founder, Edwin A. Link, to placing marine scientists in and under the sea.

Specifications

The R/V SEWARD JOHNSON was designed by Rodney E. Lay and Associates and constructed by Atlantic Marine, Inc., both of Jacksonville, Florida. These firms had previous experience as designers and builders of the R/V CAPE FLORIDA and R/V CAPE HATTERAS, recent additions to the U.S. oceanographic fleet.

The vessel is 176 ft. LOA, has a 36 ft. beam and a 12 ft. draft. Her displacement is 800 short tons and the gross tonnage is 298. She has a maximum speed of 14 kts, a range of 8000 nm and berthing for 30. The anticipated crew is 7-8. The remaining berthing space would be shared by submersible crew and scientists depending upon the mission. There is tankage for 60,000 gallons of fuel and 12,000 gallons of potable water (plus two distillation units). The vessel and her submersible handling system are ABS classed.

The ship's main propulsion consists of twin Caterpillar D.I. 3512 diesel engines (1200 rpm) producing 850 shaft horsepower each. While on station, the submersibles will be launched, tracked and recovered using a secondary propulsion and station keeping system. In this mode, the ship's three diesel generator sets can be coupled via an SCR system to handle the hotel load as well as drive bow and stern thrusters. The generator sets consist of Caterpillar 3406 D.I.T.A. engines driving 295 kW Kato generators. The SCR micro-processors call for the required generating capacity and divide the load as needed. The thrusters are Elliot White

Gill 32T3s, are 360 degree rotatable and develop 7000 lbs of thrust each. This is sufficient to move the ship through the water at 4 kts. The station keeping feature will also allow use of a remotely operated vehicle (ROV) as well as deployment of over-the-side oceanographic gear.

The ship's position relative to the submersible or an ROV will be maintained with a Honeywell Hydrostar acoustic positioning system and a Model 3105 three-axis controller and closed loop automatic dynamic positioning system. Communication with the submersibles is via a STRAZA UQC underwater telephone with a Model ATM 504-15 TIPE (Transponder, Interrogator, Pinger, Echosounder).

There are three control stations for conning the vessel. Two are located on the bridge and one in the operations electronics lab. One bridge station is positioned in the forward console and the other in a glassed-in cupola on the starboard-aft section of the bridge. This latter station allows added visibility for docking the vessel, launch and recovery of submersibles and handling of wire-deployed oceanographic equipment. The ship handler will also be able to view oceanographic winches mounted on the 01 deck and operate the winches remotely. Both stations have gyro repeaters, autopilot, engine, rudder and thruster controls as well as Loran C heads and plotters. The conning station in the operations electronics lab, located on the main deck, will allow control of the vessel while handling an ROV.

Navigation equipment includes a Sperry Mark 37 gyrocompass and repeaters, Sperry magnetic compass, and Sperry autopilot. The two radars are Furuno 1221 and 1411 units complete with RDI Mar 3 collision avoidance system, MT 100 mag tape recorder and GD 2000 color video plotter. There are three Northstar 7000 main frames with five control heads. The Northstars are coupled with Epsco plotters and Digitac printers at both bridge control stations and in the operations electronics lab. A Navidyne ESZ 4000 satellite navigation system is located on the bridge and interfaced with the ship's gyro and knot log.

Communications equipment includes two Harris RF-230M SSB transceivers with a remote to the forward conning station and a 1 kW amplifier. VHF communication is with a Sailor mainframe and four control heads. A single Regency Polaris VHF provides communication with surfaced submersibles as well as ADF with the surfaced craft. Both intra-ship and sound powered phone communications are also available.

Sounding equipment available are an EDO 6000 fm recorder, a Furuno FE-606B-50kHz fathometer with Furuno FCV-200 color video slave and an FE-881-28 kHz unit with digital depth. The ship will also be equipped with a Data Marine digital depth 3000 with two remotes, a Klein Model 421 side scan sonar and a Giffit PDR-Model 4000T.

Miscellaneous bridge equipment includes an Alden Mark III weather facsimile recorder, a Dytek sea-temperature recorder and a Tracor marine monitoring system to monitor

engine room and other equipment. There are bridge monitors for closed circuit TV cameras located in the engine room and in the operations electronics lab (viewing the main deck aft).

Transducers communicating with and for tracking the submersibles are mounted on a retractable array that is deployed through a well located amidships. A special watertight void is provided for the installation of navigation and research transducers.

Deck machinery includes the A-frame for submersible launch and recovery (18 short ton capacity); a trolley and track system for movement of submersibles on the main deck; a constant tension tow winch for submersible recovery, an Appleton light-weight crane (10,000 lb lift capacity) to load parts, stores, and the ship's two Boston Whalers; a Smatco anchor windless with level wind (3200 ft. 3/4" wire) and miscellaneous capstans.

The A-frame and submersible handling system were designed and constructed jointly by Harbor Branch and Caley Hydraulics of Scotland. (Caley designed the ATLANTIS II/ALVIN system as well). The A-frame and its bases are constructed entirely of aluminum to reduce topside weight and minimize maintenance. (The entire ship's superstructure is also of painted aluminum). Both of the Harbor Branch submersibles can be carried aboard the ship and the track system will be used to move them clear of the launch position for maintenance and equipment rigging purposes.

There is a submersible maintenance shop and a separate electronics shop. The maintenance shop is equipped with a mill drill, band saw, pedestal vice, sanders, welder (T.I.G.), lathe and bench grinder.

In addition to the operations electronics lab, there is a 370 sq. ft. dry lab and a 220 sq. ft. wet lab. Both labs are equipped with casework containing lab grade tops, drawers and cabinet space. The wet lab opens out onto the main deck. The dry lab has separate refrigerators, freezers and an environmental chamber.

Staterooms aboard ship are well appointed. Berths, casework and desks are available in all staterooms. No more than two persons are assigned to each, and most have a single head between each adjoining stateroom. Four single staterooms with private heads are located on the 01 deck for the captain, operations director, chief scientist and one VIP.

There is a "quiet lounge" on the 01 deck equipped with a wardroom type table. A dumbwaiter between the lounge and galley, allows meal service in the lounge.

The galley on the main deck is fully equipped with electric range, grill, deepfat fryer, microwave oven, day freezer and refrigerator, garbage disposal, trash compactor and dishwasher. It adjoins a large pantry and walk-in refrigerator and freezer. The galley opens out via a serving counter to the mess deck which seats 14 at four tables. Milk machines, coffee maker and snack reefer are

located on the mess deck. An open briefing room is situated aft of the mess deck and includes TV monitors and record/playback equipment for both 1/2" and 3/4" formats. The room also has a projection screen, sound equipment and conference table.

Finally, there is a compressor room opening onto the main deck that houses two Mako high-pressure air compressors (5000 psi), two Haskell gas transfer pumps (O_2 and HeO_2), Delmonox air filters and other equipment related to submersible support. There are gas bottles on the 01 deck that store 10,000 cu. ft. of air, O_2 , and HeO_2 . For SCUBA fill operations, there are five T-cylinders for air storage.

Time Table For Operations

R/V SEWARD JOHNSON was launched on March 17, 1984 and delivered to Harbor Branch on August 1. She is currently being fitted out with the launch and recovery system. Sea trials for submersible operations are anticipated early in 1985 and the ship is expected to be ready for duty as a research vessel and submersible support ship in the Spring of 1985.

For further information, contact the Managing Director or Director of Marine Operations of Harbor Branch Foundation, Inc., RR 1, Box 196, Ft. Pierce, Florida 33450. Telephone (305) 465-2400.