

RVIB Nathaniel B. Palmer

Principal Features and Technical Information

| General | | |
|--------------------------------------|-------------------------------------|----------|
| Vessel Owner | Offshore Vessel Services LLC | |
| Builder | North American Shipbuilding, U.S.A. | |
| Year Commissioned | 1992 | |
| Chartered to | Lockheed Martin ASC | |
| Classification | ABS A1, AMS, E, ACC, Ice Class A2 | |
| Flag | U.S.A. | |
| Principal Dimensions | | |
| Length Overall | 308.50 ft | 94.0 m |
| Length on Waterline | 279.85 ft | 85.3 m |
| Breadth Moulded | 60 ft | 18.3 m |
| Draft, Design | 22.5 ft | 6.8 m |
| Depth | 30.0 ft | 9.1 m |
| Displacement | 6,800 LT | 6,909 t |
| Light Ship Weight | 4,800 LT | 4,877 t |
| Main Propulsion Machinery | | |
| Shafts | | |
| Number of Shafts | 2 | |
| Total Shaft HorsePower | 12,700 SHP | 9,500 kW |
| Transmission and shafting efficiency | 0.96 | |
| Shaftline Bearing Loss | 2% | |
| Gearing Loss | 2% | |
| Total Brake Horsepower (BHP) | 13,200 BHP | 9,900 kW |
| Main Engines | | |
| Number of Engines | 4 | |
| Manufacturer Model | Caterpillar | 3608 |
| Prime Mover | Diesel | |
| Rating of Engine | 3,300 BHP @ 900 rpm | |
| Transmission System | Reduction Gear | |

| Gear Box | | |
|----------------------------|-------------------------------|---------------|
| Manufacturer Model | Lohmann & Stoltefort | GVL 1250B |
| Gear Ratio | 6.4 to 1 | |
| Propellers | | |
| Number of Propellers | 2 | |
| Propeller Diameter | 13.12 ft | 4 m |
| Number of Blades | 4 | |
| Material | NiAlBr | |
| Direction of Rotation | Inboard turning | |
| Hub Diameter | 4.36 ft | 1.33 m |
| Hub to Prop Diameter Ratio | 0.33 | |
| Manufacturer | Ullstein, Norway | |
| Nozzles | | |
| Inside Diameter | 13.28 ft | 4.05 m |
| Outside Diameter | 16.14 ft | 4.92 m |
| Material | Stainless Steel | |
| Stern Tub Bearing | | |
| Manufacturer | Thordon | |
| Generators | | |
| Number | 4 | |
| Rating of each | 1,400 BHP | 1,050 kW |
| Total Auxiliary Power | 5,600 BHP | 4,200 kW |
| Manufacturer Model | Caterpillar | 3512 |
| Electric Power | AC=480/240/120V, 60Hz, DC=24V | |
| Thrusters | | |
| Bow Thruster | | |
| Number | 1 | |
| Type | Water Jet Azimuthing | Flush Mounted |
| Thrust | 10.0 LT | |
| Rating | 1,400 BHP | 1,050 kW |

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| Stern Thruster | | |
|-------------------------------------|-----------------------------------|------------|
| Type | Tunnel | |
| Thrust | 6.0 LT | |
| Prime Mover | Electric Motor | |
| Rudders | | |
| Number | 2 | |
| Type | Schiling High-Lift | |
| Evaporator/Fresh Water Maker | | |
| Number | 3 | |
| Manufacturer Type | Alfa Laval | JWP-26-C80 |
| Rating of each (daily) | 15 LT | |
| Heeling System | | |
| Number of Tanks | 1 Pair | |
| Number of Pumps | 1 | |
| Total Heeling System Horsepower | 1,400 BHP | 1,050 kW |
| Manufacturer Model | Caterpillar | 3512 |
| Induced Roll & Time Period | 5° roll side to side in 2 minutes | |
| Anti-roll tanks | | |
| Number | 2 pair | |
| Dimensions | 10 ft. (W) x 60 ft (L) | |
| Percent Roll Reduction, Sea State 6 | 40-50% | |
| Waste Disposal System | | |
| Incinerator | 1 | |
| Manufacturer | Golar 500 | |
| Holding Tanks | 2-hour duration | |
| Emergency Diesel Generator | | |
| Number | 1 | |
| Rating | 300 kW | |
| Manufacturer | Caterpillar | |

| Glycol Heating System | | |
|--|----------------------------------|----------|
| Number | 2 | |
| Rating of each | 6,600,000 BTU/hr | |
| Manufacturer | Vapor Corporation | |
| Exterior Lighting | | |
| Searchlights | | |
| Number | 4 single | 1 double |
| Rating | 2.5 kW xenon with heater circuit | |
| Manufacturer | Carlisle and Finch | |
| Tank Capacities | | |
| Fuel | 425,000 | |
| At 22.5 ft draft | 1,550 LT | 1,574 t |
| At 95% maximum capacity | 1,740 LT | 1,768 t |
| Fresh Water at 95% | 215 LT | 218 t |
| Ballast Water at 95% | 1,000 LT | 1,016 t |
| Aviation Fuel at 95% | 34 LT | |
| Heeling Tanks (16 ft level) | 227 LT | |
| Antiroll Tanks (4.5 ft level) | 173 LT | |
| Endurance | 15,000 NM @ 12 knots | |
| Accommodations | | |
| Crew Owner | 22 | 5 |
| Scientists and Staff | 39 | |
| Spare | 2 | |
| Total Accommodations | 68 | |
| Special Features | | |
| Helicopter hangar and ability to carry two small helicopters and 7,200 gallons of fuel | | |
| Low friction hull coating (Inerta 160) | | |
| No fuel oil in double bottom | | |
| One compartment damage stability standard | | |

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| Special Features (continued) | | |
|---|-----------------------------------|------------------|
| Overboard discharge on port side only | | |
| Uninterruptible and conditioned power in main work area and computer lab | | |
| Two boilers to circulate water/antifreeze mixture under exterior deck on main level | | |
| Design Air Temperature | 100° to -50° F | 37.8° to 45.6° C |
| Design Water Temperature | 85° to 28° F | 29.4° to -2.2° C |
| Drinking water made from seawater | 12,000 gal/day maximum production | |
| Other Features and Space Allocations | | |
| Aloft Observation Station (deck height) | 80 ft above water surface | |
| Pilot House (deck height) | 54 ft above water surface | |
| Main Science Deck aft (deck height) | 9 ft above water surface | |
| Pilot House (interior width) | 74 ft | |
| Overhang at vessel side | 12 ft | |
| Helicopter Hangar | 40 ft x 32 ft | 1,300 sq ft |
| Flight Deck | 54 ft x 44 ft | 2,500 sq ft |
| Boats | | |
| Survey Boat "Cajun Cruncher" | | |
| Length | 28.8 ft | 8.8 m |
| Breadth | 10.75 ft | 3.3 m |
| Depth | 7.25 ft | 2.2 m |
| Draft (keel) | 4 ft | 1.2 m |
| Displacement | 11.3 LT | 11.5 t |
| A-frame | 800 lbs | |
| Winch | 300 m 5/16" cable | |
| Personnel Capacity | 4 scientists | 2 crew |
| Diesel Manufacturer | GM | 8V-71 |
| Diesel Engine Horsepower | 230 | |
| Propeller Diameter | 36", fixed pitch, in a nozzle | |
| Cooling System | Keel cooler | |
| Lifeboats with Davits | | |

| Number | 2 (1 port, 1 starboard) | |
|---|---------------------------|-------------|
| Capacity of each | 76 | |
| Features | Enclosed, powered (55 HP) | |
| Material | Fiberglass | |
| Manufacturer | Schat Watercraft | |
| Inflatable Rafts | | |
| Number | 1 | |
| Capacity of each | 20 | |
| Manufacturer | Suitlik | |
| Rescue Boat with Davits | | |
| Number | 1 | |
| Length | 19.7 ft | |
| Features | 100 HP outboard, 25 knots | |
| Manufacturer | J&V, Grimstad, Norway | |
| Miscellaneous Vessel Facts | | |
| Over 3,000 10x40-ft steel plates & 810,000 linear feet of welding were used on the ship | | |
| The steel plate in the bow is 1 9/16" thick and is twice the strength of regular steel | | |
| The steel on the hull is made with a low-temperature alloy rated to -60° C | | |
| 75,000 ft (14 miles) of pipe were used to outfit the ship | | |
| There are 2,700,000 feet, (511 miles) of wire inside the vessel | | |
| Total electrical generating capacity is 4.63 million watts (nearly 4,000 hair dryers) | | |
| The vessel is capable of carrying twenty, 20 ft cargo containers | | |
| Over-the-Side Handling Equipment | | |
| Cranes | | |
| Bow Crane | 5,000 lbs | 30 ft reach |
| Main Crane, forward | 20,000 lbs | 40 ft reach |
| Telescoping Main Crane | 50,000 lbs | 60 ft reach |
| Manufacturer of all cranes | Appleton Marine | |

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| A-frames | | |
|--|--|----------------------|
| A-frame on Fantail (20 tons) | 18 ft horizontal reach | 30 ft vertical reach |
| A-frame on Starboard Side (20 tons) | 13 ft horizontal reach | 17 ft vertical reach |
| Telescoping Boom for Baltic Room | 6 ton capacity, 13 ft reach from side of vessel | |
| Winches | | |
| Markey DUSH-9-11 | Deep Sea Trawl Winch, double drum | |
| | 9/16-inch mechanical wire (to starboard) | |
| | .680-inch hybrid fiber-optic/coaxial electro-mechanical (EM) cable (to port) | |
| Markey DUSH-5-5 | Waterfall Hydrographic Winch, double drum | |
| | Lower drum carries 10,000 m of 5/16-inch mechanical wire | |
| | Upper drum carries 10,000 m of .322-inch conductor EM cable | |
| Markey DUSH 5 | Oceanographic winch in Baltic Room | |
| | 10,000 m of .322-inch 3-conductor EM cable | |
| Water Column Sampling Equipment | | |
| Blake Trawl | 5 ft | |
| Otter Trawls (2) | 18 ft | 30 ft |
| Isaac Kidd Midwater Trawl | 1 m | 3 frames |
| Flat Trawl | 35 ft | |
| MOCNESS (2) | 1 m | 10 m |
| Tucker Trawl (opening/closing) | 3 nets | 1 m |
| Optical Plankton Counter | | |
| Conductivity Temperature Depth (CTD) Sensor | | |
| The Sea-Bird 911+ CTD system offers real-time operation via sea cable telemetry, includes a solid state memory module, and has a maximum depth of 6,800 m. | | |
| The CTD is mounted on a 24-bottle General Oceanics rosette sampler. The Nathaniel B. Palmer bottle inventory includes 5, 12, and 30L bottles. | | |
| Altimeter | Teledyne Benthos | PSA-916 |
| Conductivity | Sea-Bird | 4-02/O |

| | | |
|-----------------------|--------------------------|------------------|
| Conductivity | Sea-Bird | 4C, 6,800 m |
| Conductivity | Sea-Bird | 4M, 6,800 m |
| CTD Fish | Sea-Bird | SBE 9+ |
| CTD Pressure Sensor | Paroscientific | 410K-105 |
| Dissolved Oxygen | Sea-Bird | SBE 43 |
| CTD Pump | Sea-Bird | SBE 5 |
| CTD Pump | Sea-Bird | 5T |
| Fluorometer | WET Labs | AFLT |
| Pinger 12 kHz | OIS | 6000 (6,000 m) |
| PAR | Biospherical Instruments | QSP-200L4S |
| PAR | Biospherical Instruments | QCP-2300 |
| Temperature | Sea-Bird | 3-02/F |
| Temperature | Sea-Bird | 3plus, 6,800 m |
| Transmissometer | WET Labs | C-Star |
| Water-Sampling Bottle | Niskin | Bullister design |
| XBT / XCTD | Sippican | MK-21 |

Underway Seawater System

The seawater system supplies underway seawater to the Aquarium Room, Wet Lab, Hydro Lab, Helo Deck, Helo Hangar, and Baltic Room. Green strand piping, a non-metallic, chemically resistant material has been used throughout the system to minimize algae and bacterial growth.

It also maintains its structural integrity under low temperatures. Large diameter piping and a minimum of 90° turns helps prevent frazil ice formation in the system. The seawater system is also equipped with a centrifugal ice strainer/de-bubbler.

Three Seawater Intakes

| | | |
|-----------|-------------------|------------------|
| Main | At Stern Thruster | 6 in. diameter |
| Secondary | At Moon Pool | 6 in. diameter |
| Tertiary | At Center of Hull | 2.5 in. diameter |

Surface Seawater Sampling Equipment

| | | |
|-------------------|----------|--------|
| Fluorometer | WET Labs | FLRTD |
| Thermosalinograph | Sea-Bird | SBE-45 |

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| Surface Seawater Sampling Equipment (continued) | | |
|---|--|--|
| Transmissometer | WET Labs | C-Star |
| Digital Remote Temperature Sensor | Sea-Bird | SBE-38 |
| pCO ₂ Equilibration System | Lamont-Doherty Earth Observatory | |
| Aquaria | | |
| Two permanent fiberglass tanks, space for four additional Xactic tanks (4 x 4 x4 ft.) | | |
| Deck Incubators | | |
| Number | 3 | |
| Material Type | Plexiglas | UV Transparent |
| Water Purification Systems | | |
| E-pure four-holder system | Barnstead | Type I water (ultrapure) 2 L per minute |
| Diamond UV | Barnstead | TOC-free water |
| Bottom-Sampling Equipment | | |
| Dredges | | |
| Small Chain Dredge, Rock Dredge | Kahl Scientific | |
| Large Chain Dredge, Rock Dredge | Kahl Scientific | |
| Coring Equipment | | |
| The vessel can be equipped with several different coring devices designed to take vertical samples of sediment from below the sea floor. Below are the coring systems currently available on the Nathaniel B. Palmer. | | |
| Jumbo Piston Corer | Woods Hole Oceanographic Institute | |
| Standard Piston Corer | Woods Hole Oceanographic Institute | |
| Gravity Corer | | |
| Kasten Corer | State University of New York/Ocean Instruments | |
| Mega Corer | Mark I | |
| Deep Sea Rock Dredge | Scripps Institute of Oceanography | |
| Grab Sampler | Smith-MacIntyre | |

| Seismic Instrumentation | | |
|---|--|--|
| Seismic Data Logger | Geometrics | 24-Channel Geode Seismic Recorder |
| Research Vessel Data Acquisition System (RVDAS) | Lamont Doherty Earth Observatory / Raytheon Polar Services | Linux-Based Data Acquisition System |
| Magnetometer | Marine Magnetics | Seaspy |
| Digital Benthic Camera, with Strobe | Ocean Imaging Systems | DSC 10000 Strobe Model: 3831 |
| Seismic Gun Controller | Real Time Systems | HotShot Seismic Source Synchronizer |
| Gravity Meter | Bell Aerospace | BGM-3 |
| Solid Single-Channel Seismic Streamer | Geometrics | Length: 10 m active section, 12 hydro-phones |
| Seismic Sound Sources | | |
| Generator Injector (GI) Seismic Air Guns (6) | Seismic Systems Inc. | 210 cu in. configurable in volume and mode by using volume and port reducers |
| Bolt Gun 1500 Long Life Airgun | Bolt Technology Corp. | Sizes in cu. in.: 1,000, 800, 500, 450, 400, 350, 300, 200, 145, 80 |
| GI Water Gun (1) | Seismic Systems Inc. | 15 cu in. |
| Seismic Air Compressors | Borsig-LMF | 1,200 scfm 2,000 psi |
| Sonar Systems | | |
| Acoustic Doppler Current Profiler | Teledyne Benthos | NB-150 |
| Acoustic Doppler Current Profiler | Teledyne RDI | OS-38 |
| 3.5 kHz sub-bottom profiler | Knudsen | 3260 Chirp, 10 kW |
| 12 kHz bottom tracker | | |

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| Sonar Systems (continued) | | |
|--|---------------------|---------------------------------------|
| EM 120 Multibeam System | Simrad | 12 kHz full-ocean-depth swath mapping |
| The EM 120 uses a fan of narrow acoustic beams to create a map of the sea floor. Preliminary maps can be produced and plotted almost immediately after a survey is finished. | | |
| 38 & 120 kHz Scientific Echo Sounder | Simrad | EK-60 |
| 12 kHz PDR (for pinger tracking) | O.D.E.C. / Raytheon | |
| Towed Bio-Acoustic Sonar | Biosonics | DT-X 38 and 120 kHz |
| Chirp Sidescan Sonar / Sub-Bottom Profiler, towed | Teledyne Benthos | SIS-1625, max. depth: 2000 m |
| Diving Equipment | | |
| Dive Compressors (one (1) on board) | Bauer | Fills to 3,000 psi |
| Dive Van (dive gear storage and setup) | 20 x 8 x 8.5 ft. | |
| DAN (Divers Alert Network) Oxygen Kit | | |
| Meteorological Sensor Suite | | |
| Humidity/Wet Temp | RM Young | 41372LC |
| Barometer | RM Young | 61201 |
| Anemometer | Gill | Wind Observer II (ultrasonic) |
| Precision Infrared Radiometer | Eppley | PIR |
| Pyranometer | Eppley | PSP |
| PAR Radiometer | Biospherical | QSR-240 |
| PRR (mast) | Biospherical | PRR-800/810 |
| GUV (mast) | Biospherical | GUV-2511 |
| PUV (underwater) | Biospherical | PUV-2500 |
| Time & Navigation Systems | | |
| Time & Frequency Receiver and Clock | Symmetricom | XLi |
| GPS | Trimble | |
| GPS | Furuno | |
| GPS, with heading and attitude | Seatex | SeaPath 200 |
| GPS, with heading and attitude | Seatex | SeaPath 330 |

| Gyrocompass (2) | Yokogawa | KM008-E |
|---|---|------------------|
| 3 cm Radar (X-band) | Furuno | FAR 2822X |
| 10 cm Radar (S-band) | Furuno | FAR 2837S |
| HF WEFAX | Furuno | DFAX |
| HF Radio Direction Finder (RDF) | Simrad | |
| VHF Radio Direction Finder | Taiyo | TDC338H2 MKI |
| TeraScan | TeraScan | DL500 |
| The TeraScan is designed for automated reception of data from meteorological/environmental satellites and for processing the data into images and data overalys in real time. The satellite imagery is available to all participants for cruise planning, navigation, and weather monitoring. Data are collected from NOAA, DMSP, and METOP satellites. | | |
| Communication Equipment | | |
| The NBP is Global Maritime Distress Safety System (GMDSS) compliant. This means there is automatic, complete redundancy for ship to ship & ship to shore communication. | | |
| Fleet Broadband | Thrane and Thrane | FBB500 |
| Inmarsat-C | Sailor | |
| Iridium | Motorola | 9505a |
| VHF Radios | | |
| Sailor | RT146 | Bridge to Bridge |
| Sailor | RT2048 | Main |
| Sailor | RM2042 | Watch Receiver |
| HF SSB Radios | | |
| Sailor | SP300 | |
| Sailor | T2130 | |
| Computers and Networking | | |
| Windows, Macintosh, and Linux operating systems are available. There are six to eight computers available for general usage in the E-Lab, Aft Dry Lab and in the 03 Level Conference Room. | | |
| Network | 400 LAN drops throughout ship, including cabins | |
| E-mail | Transmitted via satellite every 30 minutes. | |
| Individual email size restrictions | 10 MB outgoing | 10 MB incoming |

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| Space Allocation | | |
|---|-------------------------|----------------|
| Lab spaces feature recessed unistrut on 2' centers, floor and ceiling, running fore and aft | | |
| Main Deck | | |
| Electronics/Computer Lab | 670 sq. ft | |
| Forward Dry Lab | 1,150 sq. ft | |
| Aft Dry Lab | 1,036 sq. ft | |
| Hydro Lab | 445 sq. ft | |
| Wet Lab | 416 sq. ft | |
| Bio Lab | 460 sq. ft | |
| Science Coolers | 2 @ 86 and 68 sq. ft | |
| Baltic Room / Staging Area | 680 sq. ft | |
| Aquarium Room | 298 sq. ft | |
| Marine Tech Workshop | 142 sq. ft | |
| Scientific Storage | 375 sq. ft | |
| Electronic Equipment Room | 96 sq. ft | |
| Changing / Mud Room / Darkroom | 100 sq. ft | |
| Lower Deck | | |
| Scientific Storage | 170 sq. ft | |
| Scientific Storage | four 20-foot containers | |
| Exterior Main Deck | | |
| Deck tie down points are located at 2 ft centers on the main deck and helo deck | | |
| Science Vans | | |
| Radioisotope Vans | 2 vans | 20 x 8 x 8 ft. |
| Freezer Lab Vans | 2 vans | 20 x 8 x 8 ft. |
| Garage/Trace Metal Clean Van | 1 van | 20 x 8 x 8 ft. |
| Recreation / Leisure Spaces | | |
| Library / Conference Room (03 Deck) | 700 sq. ft | |
| TV Lounge (02 Deck) | 510 sq. ft | |
| Gymnasium (01 Deck) | 400 sq. ft | |

NOTES