RVIB *Nathaniel B. Palmer*

Principal Features and Technical Information

General

Vessel Owner	Offshore Service Vessels LLC	
Builder	North American Shipbuilding, U.S.A.	
Year Commissioned	1992	
Chartered to	Leidos 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 Long Tons (LT)	6,909 t
Light Ship Weight	4,800 LT	4,877 t

Main Propulsion Machinery

Shafts		
Number of Shafts	2	
Total Shaft HorsePower (SHP)	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
Stern Thruster		
Type	Tunnel	
Thrust	6.0 LT	
Prime Mover	Electric Motor	

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Rudders

Number	2	
Type	Schilling 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 zenon with heater circuit	
Manufacturer	Carlisle and Finch	

Tank Capacities

Fuel	425,000 gallons	
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 (two spare berths)	
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		
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	

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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 crane	Appleton Marine	
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	

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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

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	Valeport	VA-500
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	5T
Fluorometer	WET Labs	ECO-FL
PAR	Biospherical Instruments	QCP-2350-HP
PAR	Biospherical Instruments	QSP-2300/2350
PAR	Biospherical Instruments	QSP-200L4S
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 help prevent frazil ice formation in the system.

Seawater Intake

Main	At Stern Thruster	6 in. diameter

Surface Seawater Sampling Equipment

Fluorometer	WET Labs	ECO-FL
Thermosalinograph	Sea-Bird	SBE-45

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 RVIB *Nathaniel B. Palmer*.

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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	Geode 24 w/ Marine Multi-Geode OS
Research Vessel Data Acquisition System (RVDAS)	Lamont Doherty Earth Observatory / Leidos	Linux-Based Data Acquisition System
Magnetometer	Marine Magnetics	Seaspy
Digital Benthic Camera, with Strobe	Ocean Imaging Systems	DSC 10000 Strobe Model: 3831
Four-Gun Seismic Gun Controller	Real Time Systems	SCTL-2 (HotShot 2); HotShot 1 (qty: 2)
Gravity Meter	Bell Aerospace	BGM-3
Solid Single-Channel Seismic Streamer (2); Length: 100 m active section, 24 channels, 72 hydrophones, 300m lead-in tow cable	Geometrics	MicroEel
Seismic Sound Sources		
Generator Injector (GI) Seismic Air Guns (6)	Seismic Systems Inc.	210 cu in. volume, configurable in both volume and mode via 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 (ADCP)	RD Industries	OS-75
ADCP	RD Industries	OS-38
3.5 kHz sub-bottom profiler; 12 kHz bottom tracker	Knudsen	3260 Chirp, 10 kW
EM 122 Multibeam System	Simrad	12 kHz full-ocean-depth swath mapping
The EM 122 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, and 200 kHz Scientific Echo Sounder	Simrad	EK-60
Chirp Sidescan Sonar / Sub-Bottom Profiler, towed, max. depth: 2000 m	Teledyne Benthos	SIS-1625

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/Temperature/DewPoint	Rotronic	HC2A-S3
Barometer	Vaisala	PTB210B
Anemometer	Gill	Wind Observer II (ultrasonic)
Precision Infrared Radiometer	Eppley	PIR
Pyranometer	Eppley	PSP
PAR Radiometer	Biospherical Instruments	QSR-2100
PRR (mast)	Biospherical Instruments	PRR-800/810
GUV (mast)	Biospherical Instruments	GUV-2511
PUV (underwater)	Biospherical Instruments	PUV-2500

Time & Navigation Systems

Time & Frequency Receiver and Clock	Symmetricom	XLi
GPS	Furuno	
GPS, with heading and attitude	Seatex	SeaPath 200
GPS, with heading and attitude	Seatex	SeaPath 330

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Gyrocompass (2)	Teledyne (Meridian)	MK2 Standard
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

Communications Equipment

StarShield	SpaceX	Flat High Performance
Iridium Certus	Thales	VesseLINK 700
Iridium	Cobham	SC4000
VHF Radios		
Sailor	RT146	Bridge to Bridge
Sailor	RT2048	Main
Sailor	RM2042	Watch Receiver
HF SSB Radios		
Sailor	SP300	
Sailor	T2130	

The RVIB *Nathaniel B. Palmer* is Global Maritime Distress Safety System (GMDSS) compliant. This means there is automatic and complete redundancy for each mode of communication for both ship to ship and ship to shore. These systems are provided and maintained by the vessel owner, Offshore Service Vessels LLC.

Computers and Networking

Windows, Macintosh, and Linux operating systems available. There are six to eight computers available for general usage in the Electronics Lab (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

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 on 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	