NDSF NATIONAL DEEP SUBMERGENCE FACILITY

JASON

Jason is a remotely operated vehicle (ROV) system designed by the Woods Hole Oceanographic Institution's Deep Submergence Laboratory for scientific investigation of the deep ocean and seafloor. Jason can operate in conjunction with Medea as a two body ROV system or it can operate by itself as a single body ROV.

Two Body Mode

Together, Jason and Medea offer wide area survey capabilities with Jason as a precision multi-sensory imaging and sampling platform. Both Medea and Jason are designed to operate to a maximum depth of 6,500 meters (21,385 feet), are transportable, and can be operated from a variety of vessels. The current Jason ROV has conducted over 1000 dives since 2002 with an average bottom time of more than 21 hours per dive. The longest dive to date exceeded 100 hours.

Medea is connected to the surface ship by a 0.68 inch armored cable with three fibers and three electrical conductors. Jason is connected to Medea by a neutrally buoyant tether that is 2.1 centimeters (0.84 inch) in diameter and approximately 50 meters (164 feet) long.

Jason is designed for detailed survey and sampling tasks that require a high degree of maneuverability. It weighs 4,672 kilograms (10,300 pounds) in air but is neutrally buoyant at depth. Jason's closed-loop controlled dynamic positioning abilities make it a very maneuverable and stable platform.

Both Medea and Jason have been designed to be superior real time optical imaging platforms with high quality cameras and lighting. The vehicles work together to provide lighting for each other in a fashion not commonly available in other submersible systems. Medea is configured with three cameras for tether management and terrain identification and visual location of Jason when both are operating.

Single Body Mode

In single body mode, Jason is attached directly to the main armored cable which is a larger diameter (.842") cable specifically designed to allow for heavy lifting operations. Syntactic foam floats are installed during launch onto the main cable to float a section of cable close to the vehicle and maintain a catanary. The cable comes off the direct drive heave compensated winch and is fairlead through a new larger knuckle boom overboarding crane.

There are two tool sleds that can be used with the single body system. One is the science sled that has two hydraulically actuated swing arms and a large front basket. It also has a rear science bay that can accommodate large science sampling systems.

The second sled is the heavy lift sled. This sled adds significant capabilities to Jason including heavy lift operations of up to 4,000 lbs using either the bottom mounted hydraulic latches or the bottom mounted heavy lift winch. These capabilities are essential to carrying out increasingly common tasks such as observatory installation and maintence as well as large mooring deployments and cable laying. Single Body mode also allows for use of the under vehicle elevator which can carry large quantities of samples and equipment to and from the seafloor.

The Control Vans accommodate the operator positions (pilot, engineer and navigator) and stations for the scientific watch leader, event logger and data/video recorder plus auxiliary stations for 1 or 2 additional observers. Thus, a full complement of up to 5 scientists can be comfortably accommodated in the vans at any one time. There is also a remote viewing station, with comms to the van, that can be set up elsewhere aboard ship.

Above: JASON 1-body operations;
Inset: Medea for 2-body ops

Specifications

Functions	2-body system	1-body system
Operation	Tether, 70 meters lengths, 20 millimeters (0.8 inch) diameter, neutrally buoyant	Armored Cable Umbilical, 7 kilometers lengths, 21.5 millimeters (.842 inch) diameter
Vehicle size	3.4 meters long, 2.4 meters high, 2.2 meters wide	3.4 meters long, 2.4 meters high, 2.2 meters wide
Weight	~ 4,672 kg (~ 11,000 lb) in air	~ 4,672 kg (~ 11,000 lb) in air
Maximum Transit Speed	Up to 1 knot, no sampling, in layback mode	Up to .6 knot, no sampling
Descent/Ascent Rate	30 meters/min.	30 meters/min.
Propulsion	Six brushless DC electric thrusters, 256 pounds per thruster	Six brushless DC electric thrusters, 256 pounds per thruster
Payload	450 lb (depth dependent)	4000 lb (heavy lift mode)

Imaging

4K UHD Still camera and Mini Zues HD Video cameras with file-based data storage system

Standard camera Configuration:

- Scientist's pan & tilt: Mini- Zues HD camera, 4K UHD Still camera
- Pilot's pan & tilt: Mini Zues HD camera
- Light bar: pan and tilt with Mini Zues HD camera
- Utility Color camera: Manipulators, Basket, Aft Looking, Down Looking

Lighting

Sixteen 17,700 Lumen LED lights, providing over 283K Lumens

Two 250 watt Incandescent

Alternate custom Imaging available as needed - contact NDSF

Scientific Instrument Support

A flexible Telemetry and Power System with excess capability including high speed serial, ethernet and video channels.

Switched power at various typical sub sea voltages is available.

Vehicle Sensors

Attitude and Heading: Fiber optic north-seeking gyro

Pressure Sensor: Paroscientific

Altimeter: 300 kHz, 100 meter (328 feet) range, and 1200 kHz, 30 meter (98.4 feet) range

Acoustic Sensors

Navigation:

- Sonardyne RangerPro USBL Navigation
- 7–12 kHz, vehicle powered or battery operated for emergency location
- RDI Doppler Velocity Log 1200 kHz with 30m bottom lock range or 300 kHz with 100m bottom lock range
  Used for closed-loop controlled dynamic positioning
- Reson SeaBat 7125 Multi-Beam Sonar

Manipulators/Sampling

2x Schilling Titan 4 hydraulic bi-directional functions available for science:

- Hydraulic - 7 function, 6 degrees of freedom

Sample Storage:

- Forward sampling drawer (basket), 98 centimeters (38.5 inches) x 1.52 meters (60 inches), with hydraulic movement. Two swing arms, one each side, 51 centimeters (20 inches) x 51 centimeters (20 inches), with hydraulic movement
- Payload (Single Body): Up to 4,000 lbs.

Elevator Sampler - mission configurable

- Free ascent
- Payload: 200 lbs.

For more information please contact:

Jason Program: jason_program@whoi.edu
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Also visit the Jason program website at:
ndsf.whoi.edu/jason

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