Docking Reliability of the LARS for Single-Body Jason

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Launch And Recovery System (LARS) for Single Body Jason
Single-Body LARS: Thompson / Revelle / Brown Layout

**Rapp** Power van
*Mounted on top of winch to save deck space*

**Rapp** Winch drum section (under-wound with 0.842” cable)

**Rapp** Level Wind for 0.842” cable in side-mount position
*Braced against LARS Base for reduced winch deck loads*

**Airline Hydraulics HPU**

**In-house design Crane Base**
* Allows winch to mount to either forward or inboard edge depending on ship*

**North Pacific Crane Co. LARS Crane**
*Includes latching Docking Head*
Single-Body Jason LARS: Features & Specs

**LARS Crane**
- 20 ft Reach in Sea State 4 (OOI-RCA Package Deployment)
- 15,000 lb capacity: ROV + <4000 lb. packages
- Latching Docking Head with powered sheave to prevent cable slack in sheave train
- Ships knuckled as one piece with Base

**Winch**
- Carries 5200 m of 0.842” cable
- Active Heave Compensation reduces motion during deployment
- Constant Tension mode for LAR Docking
How Docking Works: in a Recovery Sequence

1. **Winch**: Haul in to bring Jason up to DH until air springs compressed.  
   *Max winch torque setting (full drum) will stop the winch at 16,000 lb (for 10,500 to 15,000 lb Jason air weight)*

2. **Crane**: Engage DH hydraulic latches

3. **Winch**: Pay out to lower Jason bullet onto DH latches.

4. 3 Operator Checks to confirm latch:
   1. Latch Light On
   2. Slack cable catenary
   3. “Latch visually confirmed”  
   *Call from control van. IP deck camera in DH*

5. **Winch**: Engage “Constant Tension” mode ~2000 lb setting to take up slack

6. **Crane**: Release DH swing brake

7. **Crane**: Knuckle in and slew around to deck position for Jason

8. **Crane**: Set DH swing brake

9. **Winch**: Disengage “Constant Tension” mode

10. **Winch**: Haul in to re-compress DH air springs

11. Operator Check that winch control reads 16,000 lb

12. **Crane**: Retract Latches

13. **Winch**: Pay out to lower Jason down to deck.
Elements for Safe, Secure Docking

• **Winch Torque limit** Set to 16,000 lb - a max value that prevents two-block damage when Jason is docked at reasonable approach speed.

• **Air springs** Provide 4 inches of compliant travel to allow winch to decelerate as torque limiting kicks in.

• **Latch Indicators** 3 redundant indicators that the Latch is holding the load.

• **Transferring most of load to a Latch** Gives winch in tension control mode overhead (above and below) for lagging the crane to avoid slack tension and excess tension

• **A Secure Latch** Geometry & Counterbalance valve keep Latch closed
1 BULLET PULLED UP BY WINCH (STOPPING AT MAX TORQUE SETTING)

- 2x Latch Plates
- Docking Bullet
  - At top of Jason on a 2-axis pivot
  - Cable Termination screws into top
LATCH ENGAGED
(HANDLE HELD)

Docking Bullet
-At top of Jason on a 2-axis pivot
-Cable Termination screws into top

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2x Latch Plates

Docking Bullet
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Bullet Lowered with winch