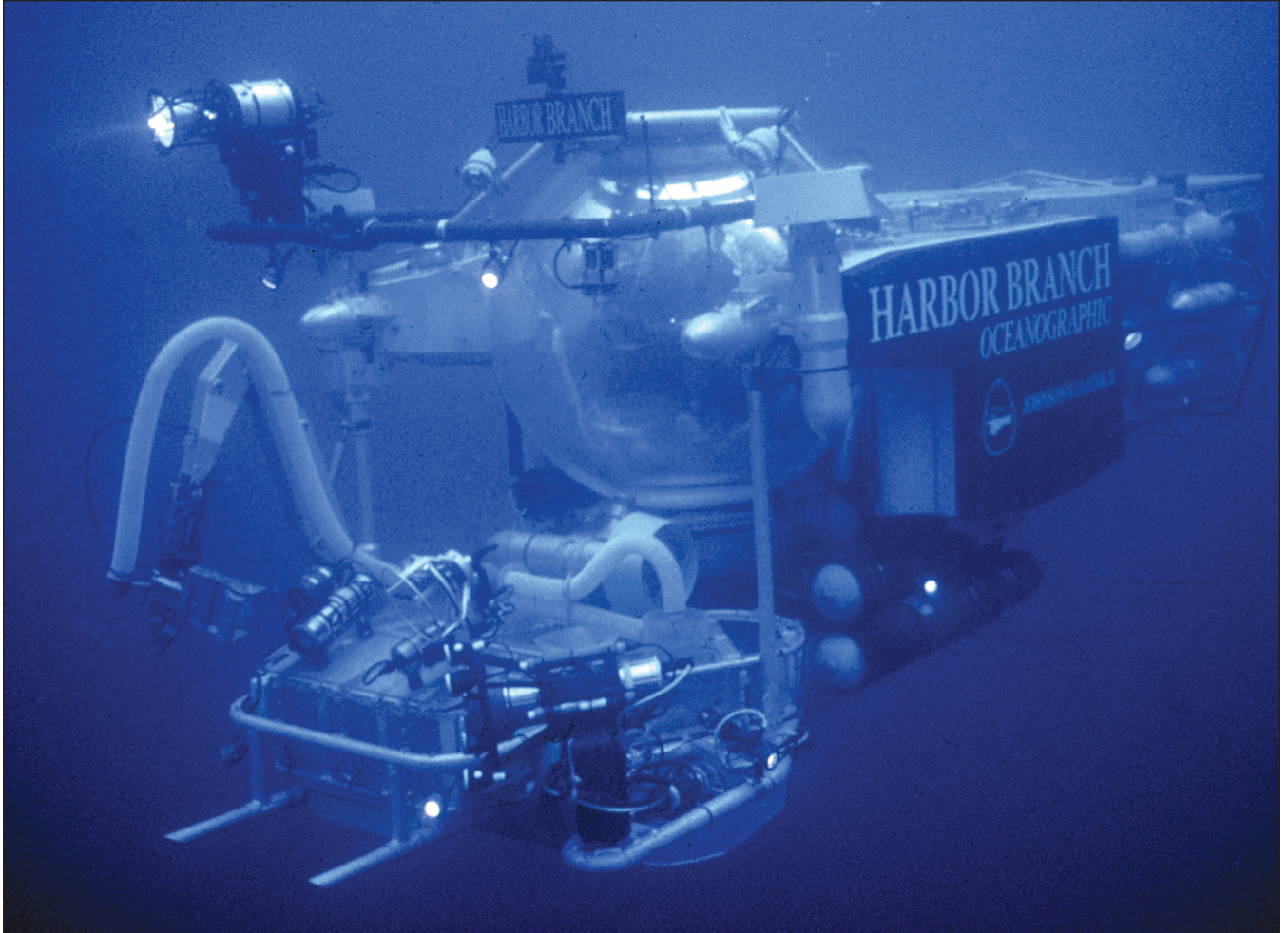


Chapter 10



Hydraulics and Payloads

Chapter 10: Hydraulics and Payloads

Stories From Real Life: Lethbridge's Diving Barrel

Chapter Outline

1. **Introduction**
2. **Hydraulic Mechanisms**
 - 2.1. How Hydraulic Systems Work
 - 2.2. Force Amplification
 - 2.3. Hydraulic Versus Electrical Power Delivery
 - 2.4. How to Build Your Own Hydraulic System
 - 2.5. The Pneumatic System Option
3. **Manipulators**
 - 3.1. Components of a Manipulator System
 - 3.2. Home-Built Manipulators—A Case Study
4. **Underwater Tasks and Tools**
 - 4.1. Tow Sleds
 - 4.2. Tools
5. **Considerations When Designing Payloads**
 - 5.1. Mass, Buoyancy, and Stability
 - 5.2. Lifting
 - 5.3. Reaction Forces
 - 5.4. System Interference
6. **Examples of Payload Options for Simple ROVs**
 - 6.1. Gripper Variations
7. **Chapter Summary**

Chapter Learning Outcomes

- Describe what a payload is and why it's important for an underwater robotic vehicle. Why are multiple and/or interchangeable payloads particularly useful?
- Explain the basic components of a standard hydraulic system and how these systems can be used to transfer force, motion, and power from a prime mover to an actuator.
- Contrast a single-function manipulator with a more complex multi-function version.
- Describe options for building a single- or double-function manipulator for a simple ROV like *SeaMATE*.
- Describe different types of payload tools carried by various commercial underwater robotic vehicles.

Figure 10.1.cover:
Johnson-Sea-Link

Sporting a full array of sophisticated instruments, cameras, and payload tools, the Johnson-Sea-Link submersible descends on another mission for science.

Image courtesy of Scott Olson,
Harbor Branch Oceanographic Institution