WHOI OBS Connectors

Alan Gardner, Woods Hole Oceanographic Institution
WHOI wet connectors and cabling

• Each broadband OBS has 8 penetrators, 10 bulkhead connectors, and 2 wet cables
• Diverse connector types
Wet connector options: Subconn

- Our preferred type where possible
- Individually sealed pins
- Reasonably reliable
- Relatively easy mate/unmate
- Most pigtails and bulkheads available off the shelf
Wet connector options: Subconn

• Local rep, reasonably responsive
• Relatively inexpensive components
• We trust their ability to pot to odd materials
• We have huge track record with their penetrators in glass
• Interchangeable parts available from Seacon and Impulse
Wet connector options: Impulse rubber molded / glass filled epoxy

• Not individually sealed pins
• Reasonably reliable
• Relatively inexpensive components
• Some pigtails and bulkheads available off the shelf
• Generally < 2 month lead time from Impulse
• Impulse rep mostly responsive
• Some types difficult to mate/unmate
• Also available from Seacon
Wet connector options: Seacon MINM Metal shell

• High pin density
• Not individually sealed pins
• Somewhat reliable
• Custom insert required from PBOF
• Significant corrosion issues
Wet connector options: Seacon MINM Metal shell

- Extremely expensive components
- Trouble with Seacon’s ability to pot cables
- Use Subconn to pot the cables
- Long lead time
- Rep not very responsive
- Mate can be difficult, and difficult to verify
Wet connector options: Subconn penetrators

• All of our connections to glass housings use penetrators
• Allows glass to be safely enclosed in plastic shell, but brings connectors out away from glass
• Expensive compared to connectors, but makes glass much more feasible
• In most cases don’t need a separate cable
Wet connector options: Penetrators

• Need extra long shaft
• Use Delrin o-ring adapter
• Need much care in installation
• Huge track record of success with Subconn penetrators
Wet connector options: Junction Box

• Using pressure balanced oil filled junction box makes complex cabling interconnects serviceable, using only standard connectors

• Otherwise need complex potted breakouts or metal pressure housings
Wet connector options: Junction Box

• Simple Delrin case, rubber bladder, and some mineral oil
• Servicing is still a pain, but is possible
• Allows many different types of connectors to be joined together (Subconn, Impulse, and Seacon)
Wet connector general principles

• Make cabling runs point to point wherever possible
• Make each connector unique – avoid Murphy’s law
• Always dummy wet connectors when not mated
Wet connector general principles

• Inspect and test after every campaign
• Hi-pot test identifies imminent failures early
• Make tests simple – eliminate operator error
• Document!
• All cables currently being serialized
Wet connector general principles

• Expect an average of about 10 year service life from penetrators, cables, and bulkheads, will refine this number as more data is available with serialization

• A $300 cable is not worth loosing a piece of a large experiment or loosing a $100k instrument
Some issues seen

• Seacon corrosion and leaks
Some issues seen
• Seacon corrosion and leaks

Some data loss
Some issues seen

• Seacon oil extrusion from PBOF jbox
Some issues seen

• Occasional Subconn leaks (typically asymptomatic)
Some issues seen

• Occasional Impulse / Seacon leaks (data impacted)
Some issues seen

• Transducer corrosion