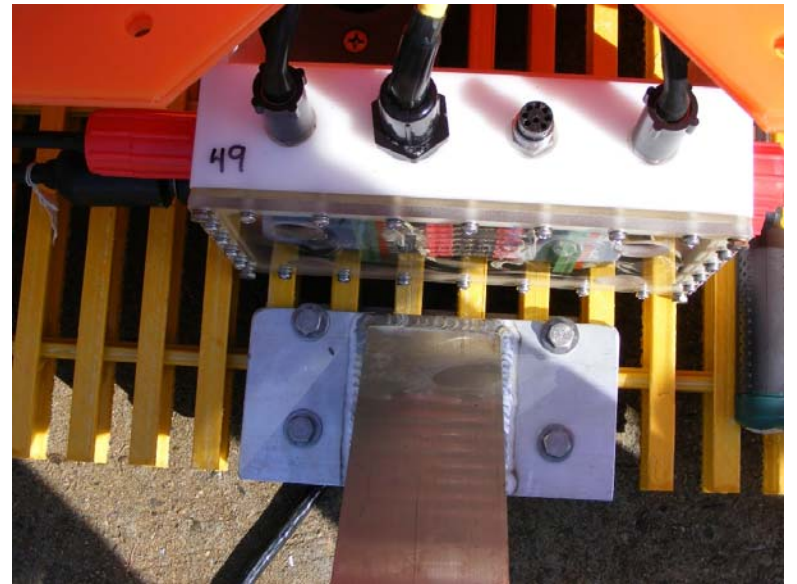
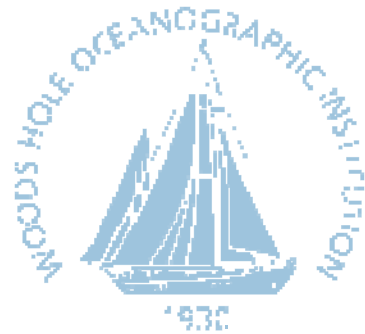


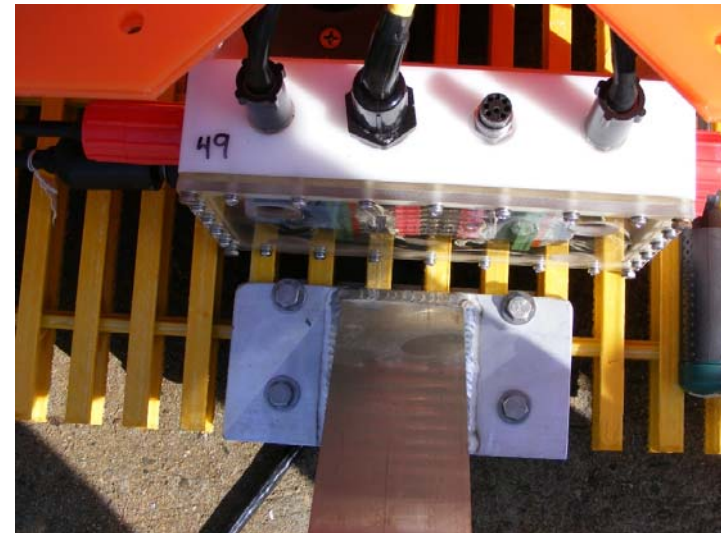
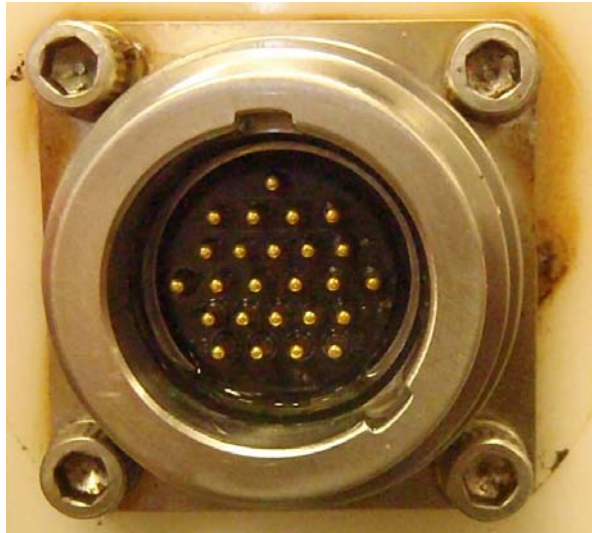
# WHOI OBS Connectors

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



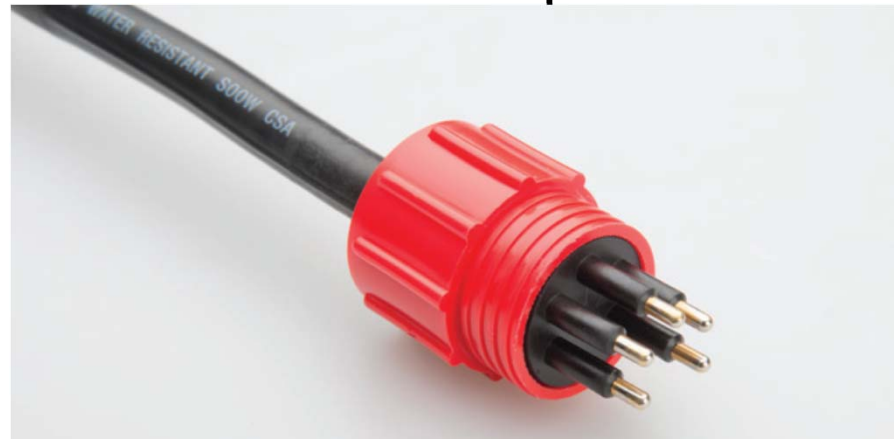
## Wet connector options: Subconn

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



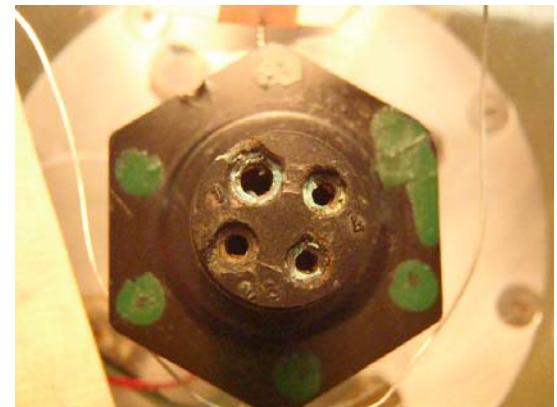
## Wet connector options: Subconn

- 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

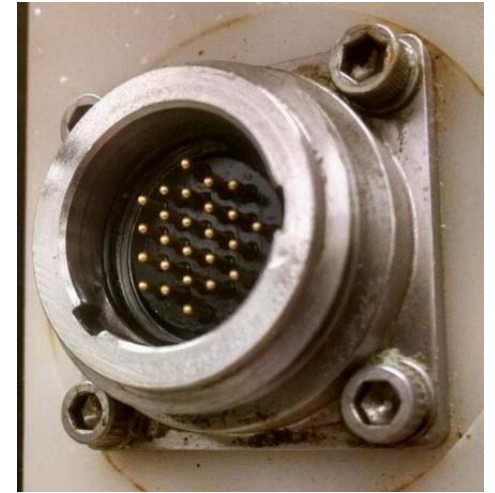
- Not individually sealed pins
- Reasonably reliable
- Relatively inexpensive components
- Some pigtails and bulkheads available off the shelf
- Generally < 2 month lead time from Impulse
- Impulse rep mostly responsive
- Some types difficult to mate/unmate
- Also available from Seacon





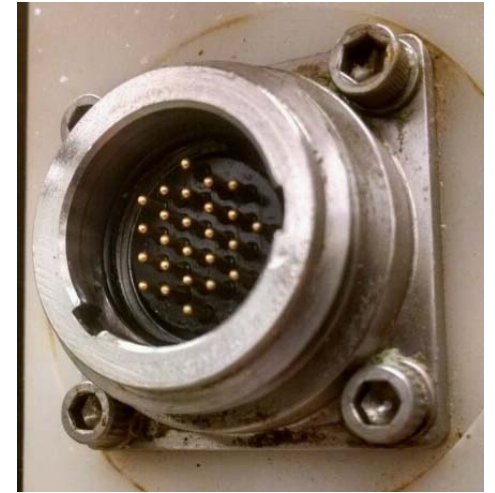
# Wet connector options: Seacon MINM Metal shell

- High pin density
- Not individually sealed pins
- Somewhat reliable
- Custom insert required from PBOF
- Significant corrosion issues



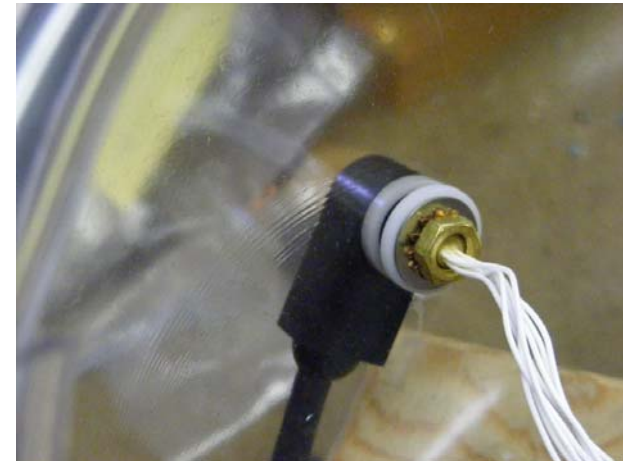
## Wet connector options: Seacon MINM Metal shell

- 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

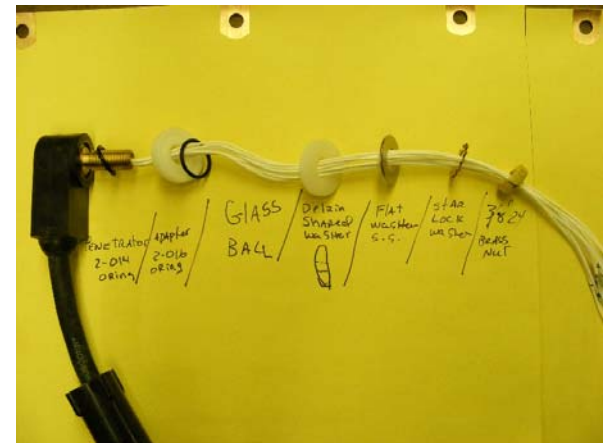
- All of our connections to glass housings use penetrators
- Allows glass to be safely enclosed in plastic shell, but brings connectors out away from glass
- Expensive compared to connectors, but makes glass much more feasible
- In most cases don't need a separate cable





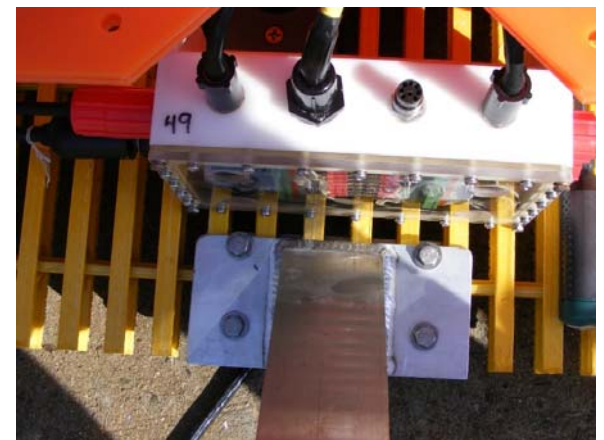
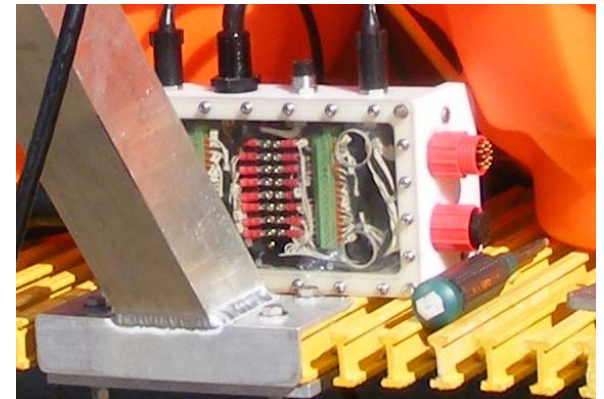
# Wet connector options: Penetrators

- Need extra long shaft
- Use Delrin o-ring adapter
- Need much care in installation
- Huge track record of success with Subconn penetrators



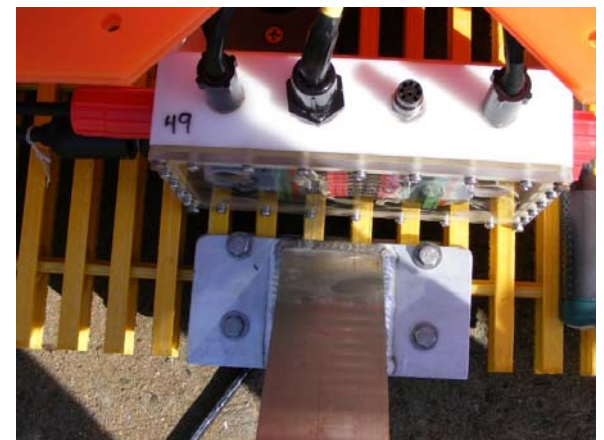
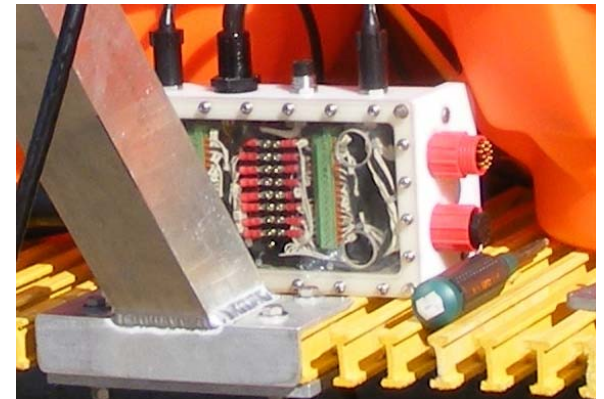
## Wet connector options: Junction Box

- 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





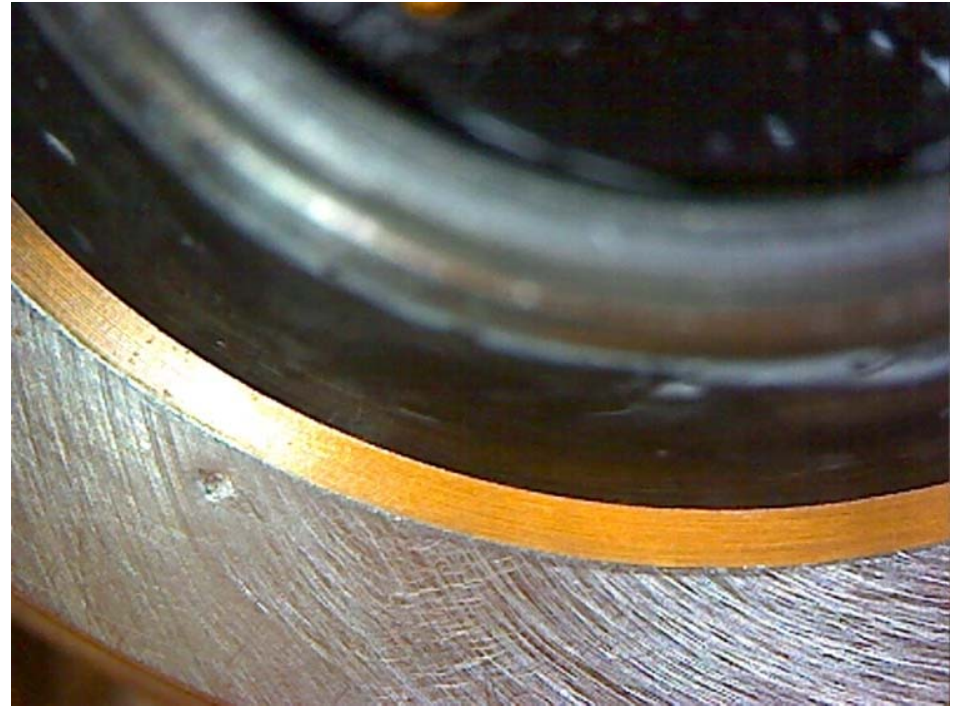
# Wet connector general principles

- 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

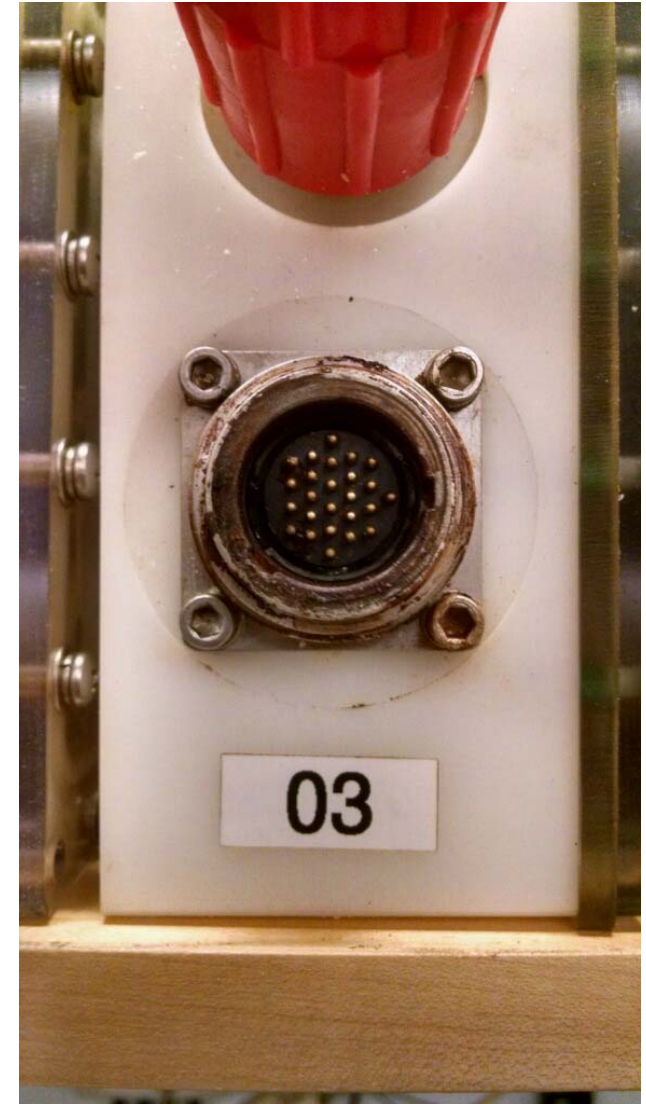




Some issues seen

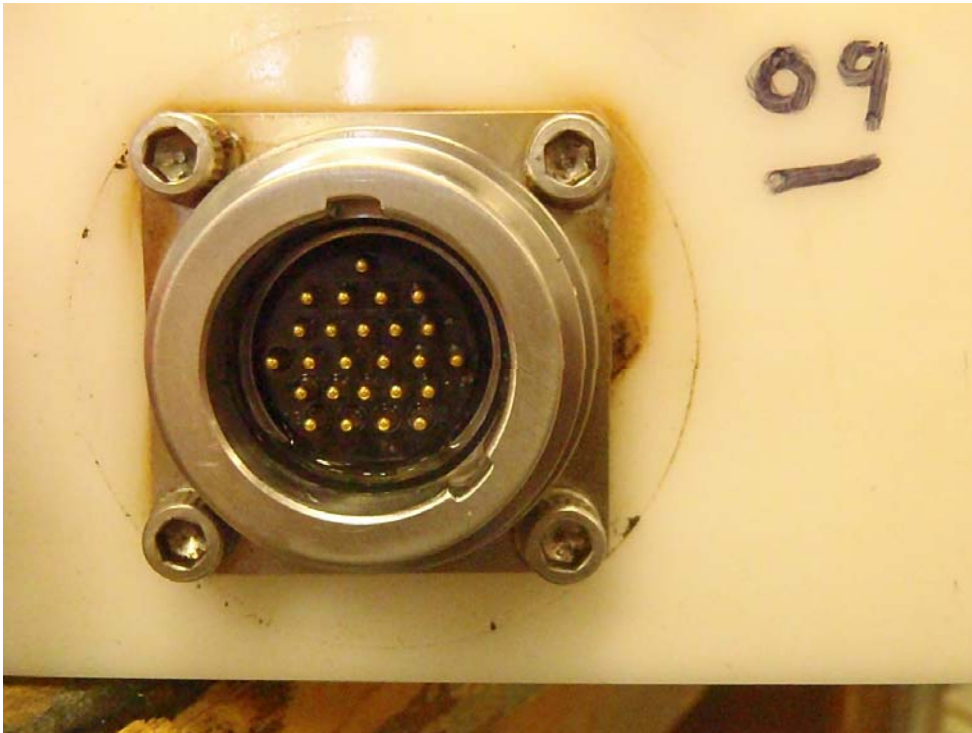
- Seacon corrosion and leaks

Some data loss



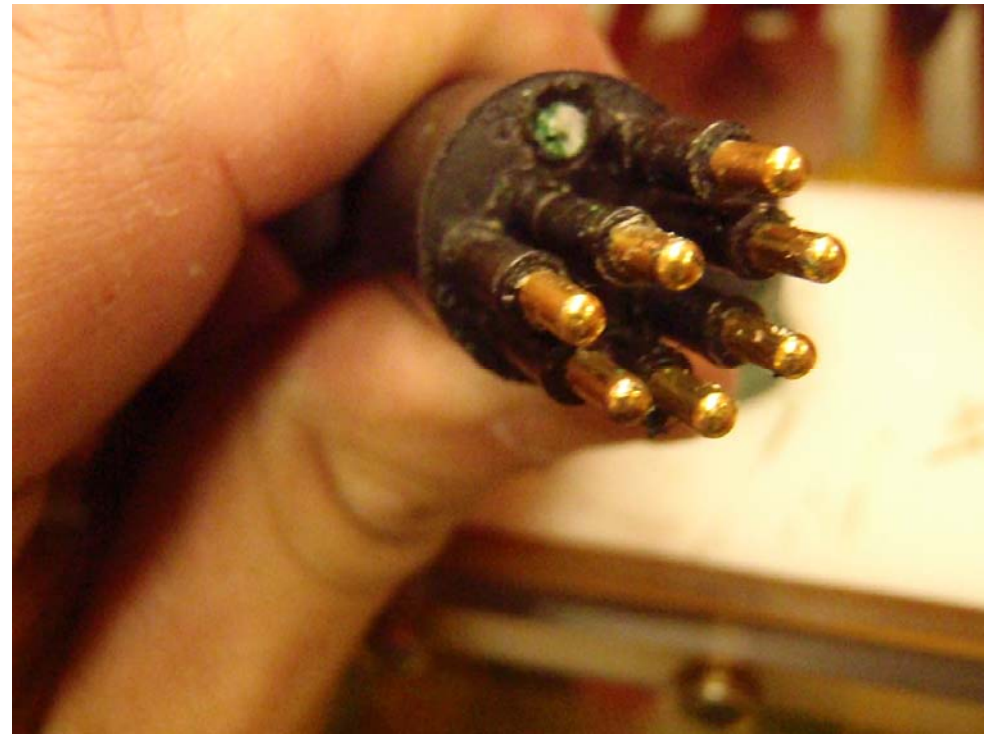
## Some issues seen

- Seacon oil extrusion from PBOF jbox



## Some issues seen

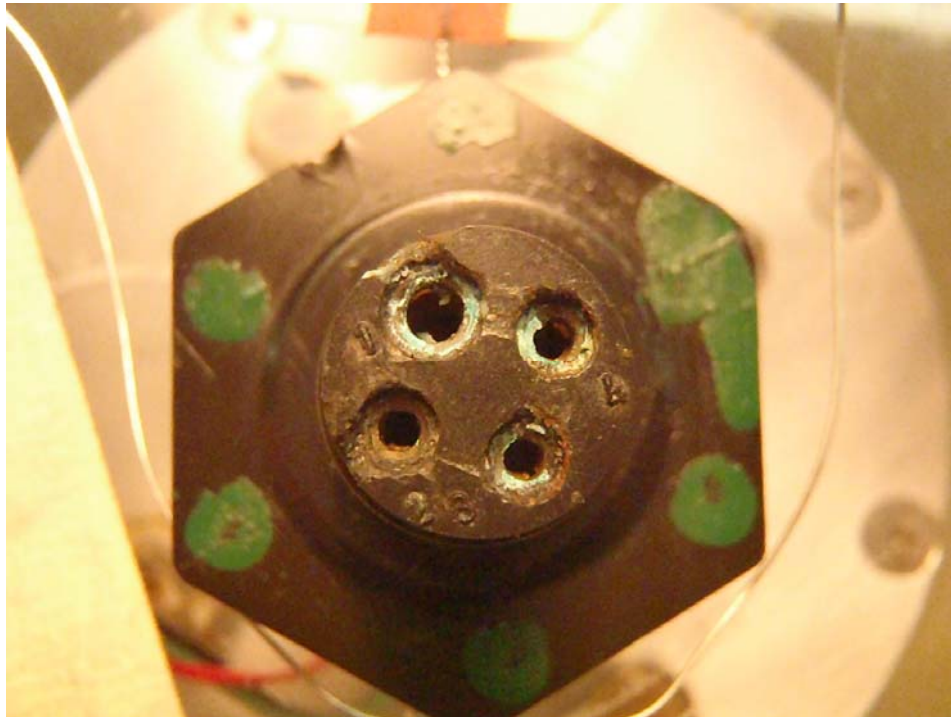
- Occasional Subconn leaks (typically asymptomatic)





## Some issues seen

- Occasional Impulse / Seacon leaks (data impacted)



## Some issues seen

- Transducer corrosion

