Will Sellers

ENGINEER, FORMER *ALVIN* PILOT

Tom Kleindinst/WHOI

"These are radiators called 'CoolPlugs™.' This cap fits onto titanium bottles that contain the sub's electronics. Inside these pipes are heat pipes—copper tubes partially filled with an alcohol-water mixture that goes through two holes in the cap and then into the electronics bottles. The bottles ride outside the personnel sphere, mostly in the very back of *Alvin*.

You've got a lot of things going against you here. Titanium is such a great metal to use for one thing and lousy for another. It is a horrible heat-transfer material. It doesn't like to transfer heat. So it can get really warm inside that electronics bottle.

All the heat that's generated by the electronics gets run out into these radiators. The alcohol-water mixture absorbs the heat and evaporates. The vapors travel to the CoolPlug™ radiators, which have cold seawater surrounding them. That condenses the vapor back into a liquid, releasing the heat. So it keeps everything inside the electronics bottles nice and cool.

A lot of the overheating occurs while the sub's on deck. You've got to fire it up and test it, and run it on deck. But subsea, you're going to be working those electronics really hard.

[The blue goop in the tube on the right] is Aqua-Lube. Every screw that's exposed to salt water has got Aqua-Lube on it. Every time. It prevents galling. You're putting stainless steel screws into a titanium end-cap, and if the threads aren't exactly right, galling is when they get so hot that they actually become one. You'll never get them undone after that. The Aqua-Lube prevents that from happening.

And then on other parts, there's LocTite [in the small red tube on the left]. LocTite is normally used for parts that really aren't going to see salt water. You put it on threads so that once you drive the screw home, it dries and it locks the threads in place. But this is a removable thread-locker, so you can take a wrench and back it out. But that screw is not going to back out by itself.

Electro-mechanical is my specialty. The *Alvin* project has kept me busy since December. This is the fourth *Alvin* overhaul I've been involved in. I started here in '82 as a technician, became an *Alvin* pilot, and then after about five years, I went over to the group operating the remotely operated vehicle *Jason* and was chief pilot/expedition leader for 22 years.

All the vehicles are on the same basic principle. Because you're bringing things out to sea, it's all the KISS principle—Keep It Simple, Stupid. If you make it too complicated, if something goes wrong out there, you're not going to fix it like that [snaps fingers] and get right back in the water. But, there's certain things that can't help but be complicated. Like *Jason*'s telemetry system, or fiber=optics. You need some good people out there with you. ▲