

Robert Waters

CHIEF PILOT

“Why use a microscope? Because I’m old! No, really, I use it all the time. The components are all surface-mounted parts on a circuit board, and they’re small parts.

In this picture I was working on the propulsion control box for *Alvin*, using a soldering iron to do some modifications to the circuitry inside there.

The propulsion control box is the interface between the pilot’s joystick controls, the sub’s computer, and the motor controllers that drive the thrusters. This is a part taken from the old sub that we updated for the new sub.

In the old sub, everything was manual, and there was no ‘automatic’ setting. The new sub has a closed-loop control system, meaning the computers can automatically maintain a position, for example, or drive in a perfectly straight line. That’s one of several various automatic operating modes a pilot will now be able to choose in the new sub. This box selects those modes.

It’s about having backup control methods for the thrusters, in case there’s ever a problem in the system. Say, for instance, you lose one of the lateral thrusters. In the new sub, you can switch over into what’s called ‘differential mode,’ meaning

you can drive the port and starboard aft thrusters in opposing directions, and use that opposing thrust to turn the sub.

The pilot also uses this box to select where the controls come from. The pilot can control the sub from the joystick inside the sphere or can dial in to activate particular vertical or lateral thrusters. Or you can also control *Alvin* from its sail—above the hatch in the little conning tower. That’s so the pilot can stand up in there and drive the sub like a boat. We use that when we do sea trials. You can use the sail controls to drive the sub around behind the ship. You couldn’t drive the sub from below and know where you’re going, because we don’t have a periscope!

I started at WHOI in 1996. I just saw an ad to work here in a magazine. So I put in for the job. I didn’t hear anything for a year. Then out of the blue, they called me up and said, ‘Can you start next week?’ So I did.

I made *Alvin* pilot in two years and piloted for the next three. Then I was a pilot for the remotely operated vehicle *Jason* for 12 years or so. I came back here last April as a full-time *Alvin* pilot. I maintain the main schematic of the submarine—kind of the ‘maintainer’ of the overall electrical drawing. ▲



Tom Kleindinst/WHOI