

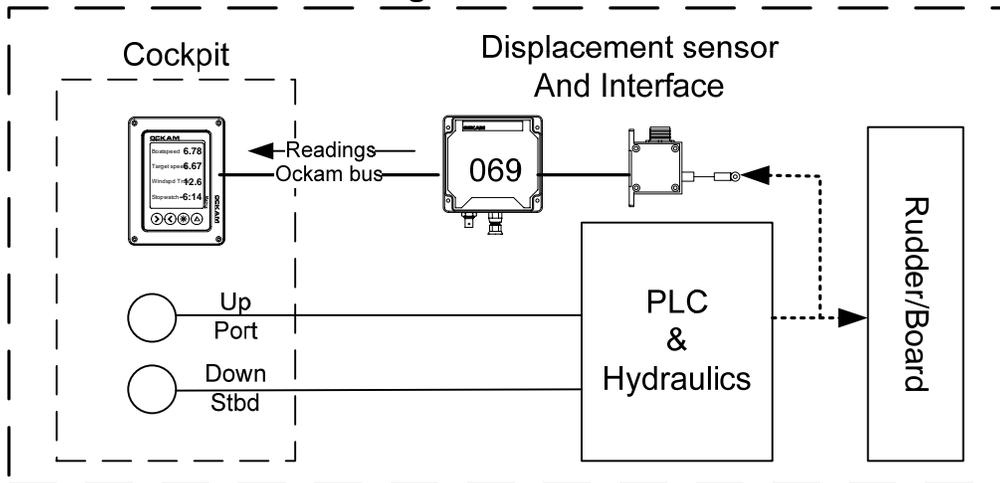
## The 099DM1 story or How to Control that Swing Keel

This is a white paper about the development of the 099DM1 Universal Displacement Controller. It has two purposes; to illustrate how the flexibility of the Ockam system makes creation of custom items relatively easy, and the to maybe trigger inquiries on other uses for the concept.

### Genesis

One of our dealers, Paul Roell, had a customer with a hydraulically-operated appendage on his boat. The position of this device was being measured by a 069 Universal Displacement Interface and displayed on the Ockam system.

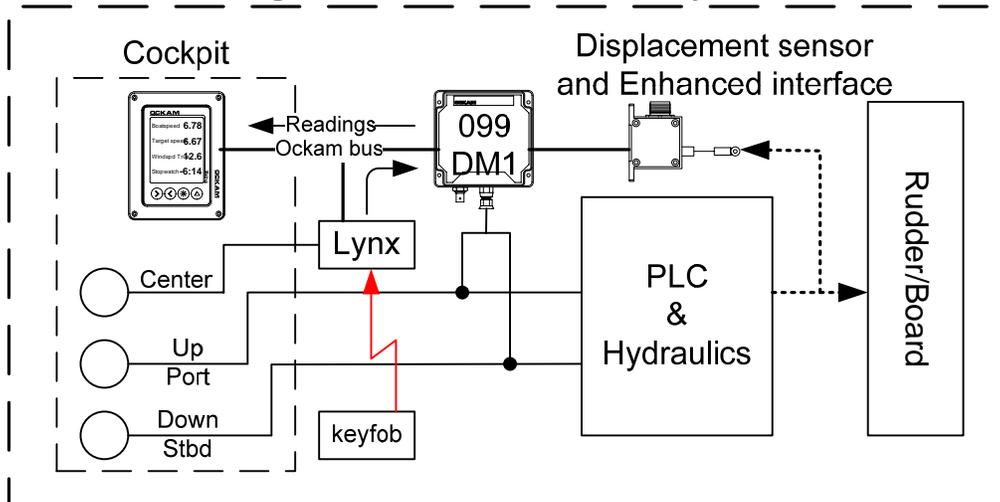
### Original Installation



There were two pushbuttons mounted at the helm to move the device back and forth. The owner asked Paul if he could figure out a way to add a "Center" button. Paul decided that this would be easiest to do if the 069 could grow two "fingers" to push the Jog buttons and move the device to zero the reading which it already knew about. He called us to discuss the possibility.

We decided that the best way to implement the idea would be to add relays and modify the code of the 069 to control the device. Since the 069 was already attached to the Ockam bus, it would be easiest to command the interface via the 058 Lynx controller. This would allow both wired and wireless control, and multiple control sources (e.g. 2 sets of buttons, and control by PC).

### New Configuration with 099DM1 and Lynx Controller



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## Design

We could have wired the Center button to the 099DM1, but by sending commands over the Ockam bus generated by the [Lynx wired/wireless controller](#), we would:

- simplify the installation - no hard wires running halfway thru the boat.
- allow both wired and wireless control from anywhere and from multiple locations if the need arose. Adding or moving control nodes would not require rewiring.
- free the command syntax from being constrained by hardware, where 1 button would equal 1 command. A hard button would mean that niceties like adjustable parameters would be more difficult to implement (e.g. cal screws).
- open up the possibility of optimum control from an onboard computer.

This design option was possible because of the modular design of the Ockam system, where new module design is not dependent on other modules.

We decided on the following design parameters:

1. Minimal change to the existing installation. The device should still work even if the instrument system failed.
2. Software adjustable limits on motion.
3. Terminate motion commands to if the goal has not been met within a software adjustable timeout.
4. Subsequent commands should be ignored if they arrive too soon after the previous command (a software adjustable lockout time).
5. A hard disable switch to turn off the interface's ability to control the device.
6. The commands would be:
  - Move a given distance from present position (**Jog**).
  - Move to a given position (**Position**). Center would then be **Position to 0**.
  - Move to same position, other side (**Tack**).
  - Set the various parameters (Limits, Timeout and Lockout).
  - Read back the various parameters.

## Execution

The existing 069 interface was taken back and modified in 2 weeks for \$1500. The package also included a program to set the parameters and exercise the device.

Paul re-installed it, now renamed 099DM1 and, since the calibrations had not been changed, everything worked perfectly out of the box.

