# Engineering Report Expedition 396T

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DVR

New Hard Drive

Just prior to COVID, we purchased new solid-state hard drives for the SUBC DVR machines, in hopes that they would provide better video recording without lost frames. Installing these drives were delayed due to COIVD until this expedition. Upon opening the drives, we found that they were only 250 GB, too small to act as a recording drive, so installation was postponed until larger drives could be purchased. Near the end of the expedition, we found that there were two sets of drives, one set being 2 TB drives. These drives would not fit in the drive bays due to their small dimensions. Kevin Grigar, designed some carriers that we had 3D printed, to fit in the drive slots. They are now installed, and have been re-labeled as the "R:" drive, so no changes in operational procedure is required.
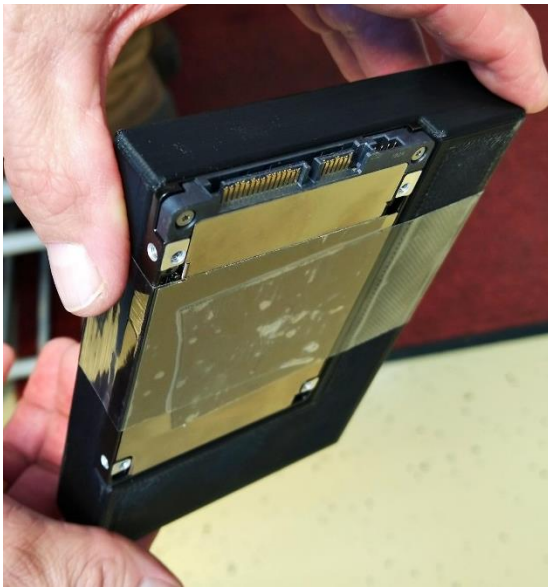
VIT

Joystick

The joystick for the pan/tilt camera has not been operational for the last several expeditions. After troubleshooting the issues, I found that the COM port from the BlackBox serial to ethernet converter to the VIT-PC was discounted. I reconnected the serial cable, but still had issues using the joystick and the GUI interface. The MCS installed new virtual com port software named "NB Virtual Com Port" from NetBurner, to replace the Vlinx drivers. The Vlinx drivers remain on the Operations superintendent's PC, in case of future need. If this driver or the com port related to it deleted/removed, we cannot get the driver back, as it can't be found on the internet.

Setting for the virtual COM port are:

a. TCP
    b. 192.168.1.28
    c. port 4001

Map the virtual drive to whichever com port is specified in the pan/tilt software. We left it at COM4.

SeaStar LEDs

The existing ROSYS LED lights are no longer produced and as they fail will need to be replaced by new ROSYS SeaStar LED flood light. Unfortunately, these are not direct replacements, and require different mounting as well as a different communications protocol. Therefore, a new mounting bracket was designed as well as, software modifications made. Unfortunately, we did not have time to purchase new mounting brackets.
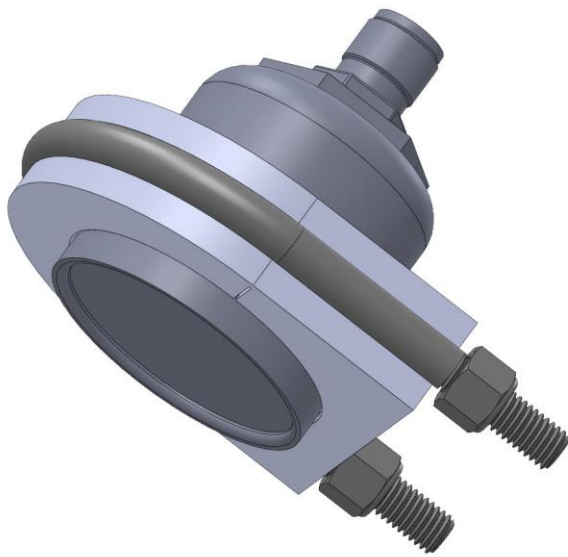
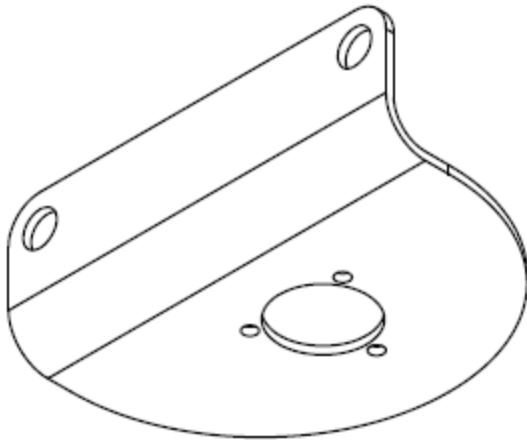*Figure 1 Preferred MLED mount design*

Figure 2:L Bracket Design

A 3-D printed version of the mount was made, but it is not solid and would crush under hydrostatic pressure. In an emergency, we might be able to print a solid version, but we feel the best short-term approach would be to fabricate an L- bracket on board to attach the LEDS to the VIT frame.

VITOF Control SoftwareChanges

The SeaStar LED lights can be used in place of any of the existing (Legacy) lights, but they must be programed with the position address and settings changed within VOYOF Control Software.

To change the control software settings, run the program as normal, then open the advanced interface, using the tool bar menu. Select the settings Tab and then the LED sub-Tab. Here each position can be set to "Legacy" or "SeaStar". You must close the program using the quit button and then restart the program for the settings to be changed.
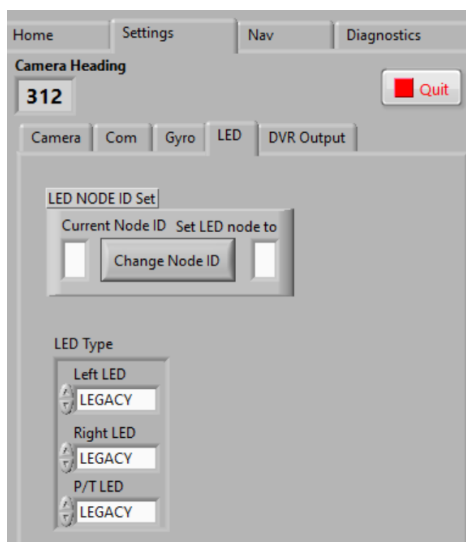

Figure 3VITOF Control Software Settings

Programming the SeaStar LEDs

To simplify the process, an external Programmer/Testing app was written. To program one of the SeaStar LED lights, it must be the only LED connected to the program/serial port. Connect the VITOF end device test cable between the LED to be programed and the computer running the programming g software. I suggest using a laptop, but it could be run on the DP PC, however this would complicate the process. IF the DP VIT-PC is used, make sure only one light is connected to the serial bus being used on the VIT frame. Also, VITOF Control software must not be running, as it uses the same com ports.

Open the "SeaStar Programmer 2021.exe" application on which ever machine is being used to program lights. I suggest this be on a laptop. Connect 24VDC to the power leads of the test cable. You may use the Intensity slider on the Home tab to test for operation. If the LED does not light, you may have to change the com port setting in the programmer software.
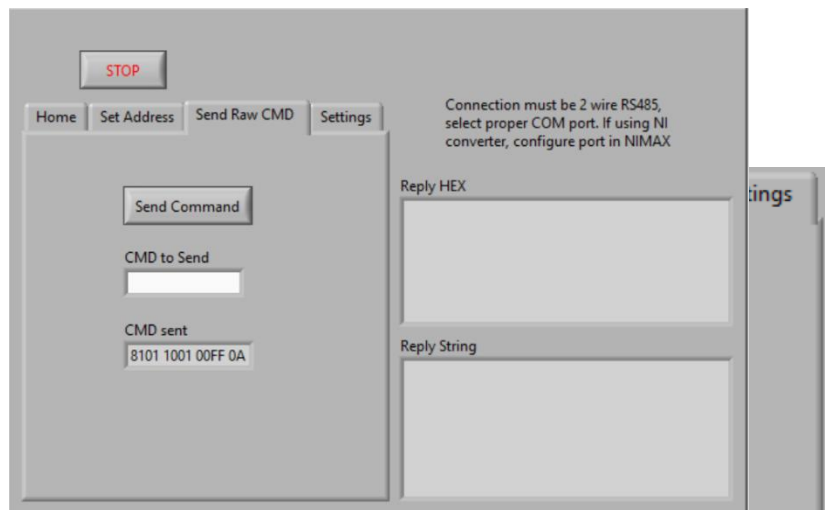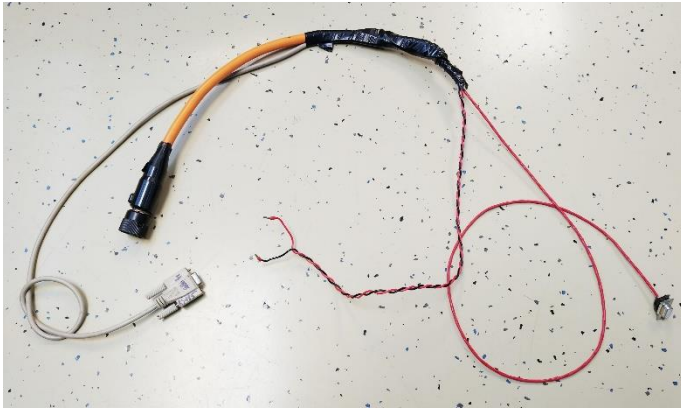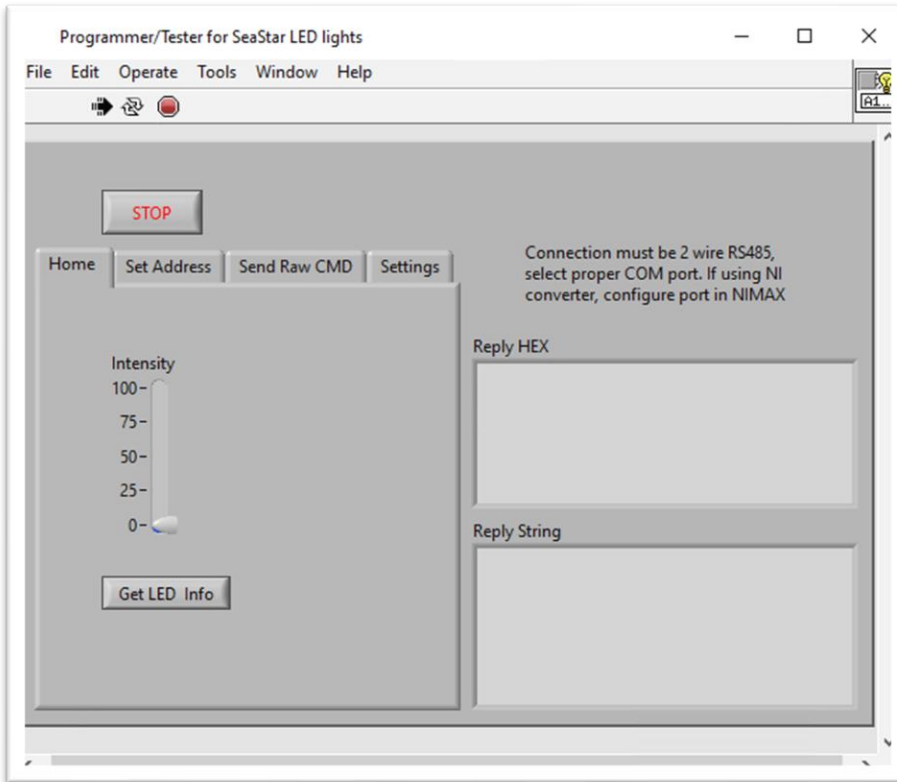
Another cause may be that the existing LED address is incorrect. By default, these are set to "1". IF you do not know the existing address, some trial an error may be required.

The Get LED info button should return information in the Replay String box that can be interpreted by referring to the LED manual.

Then Send raw CMD allows the programmer to send any command as HEX to the LED. Refer to the LED manual for commands.
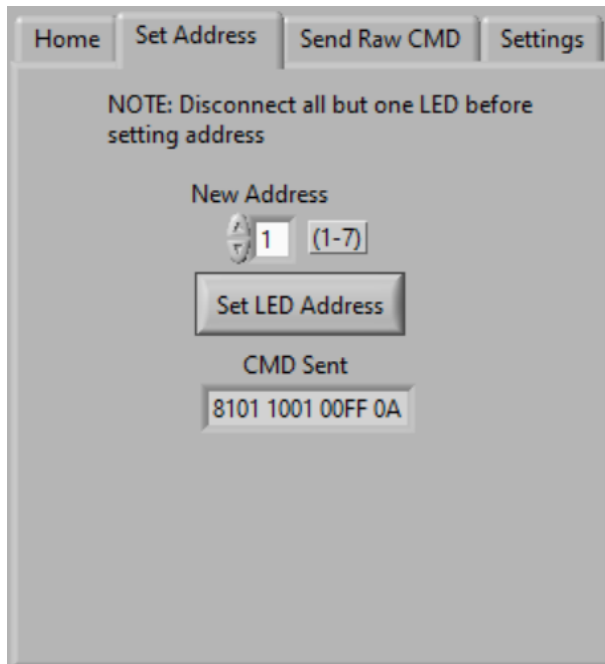
Once you are communicating with an LED, you may change the LED address, by enter the New Address in the number control and clicking on Set LED Address. Change the settings to the new address in the Settings TAB , then test the LED using the intensity slider in the home tab.

IRIS

The IRIS hardware is installed, in a separate enclosure adjacent to the Rig Watch data box in SubSea. Power and ground are separated into Rigwatch power and ground and IRIS power and ground.

Sensor signals run via 25 twisted pair cable to the IRIS box into signal splitters then return on a second 25 twisted pair cable. These signals are re-routed at the point where they enter the NI data acquisition. In the case of the digital inputs on the NI9425, the connectors have been mated to another 37 pin D-Connector, making it easy to return the signals to the RW DAQ if needed. In the case of the NI9203 analog inputs, there was not a mating connector on board, so screw terminal blocks were used to tie these conductors to the remaining 25 twisted pairs. Ground or Power are sent to the IRIS box via the conductors paired that are twisted with the signals. These are ground with the analog signal and +24VDC for the digital signals in most cases.

Splitters

Analog Signals

Most of the analog signals are 4-20mA. These are sent to the input of the SP236 splitters. There some signals that are 0-10V. I originally though we would require SP237 splitters to accept these signals. As t turns out these signals are already converted to 4-20mA with the TURCK devices. Ideally, we would have purchased more SP236 splitters but lead times are very long and could not be received in time. To remedy this, I used the SP237 splitters which accept the 0-10V, but placed 500om resistors across their

inputs to convert the current signal back to voltage. To remove any issues due to resistor tolerance, I calibrated the splitter scaling using a shorting wire for 0V and the programmable power supply apply 10V at the input of the TURCKS, while setting the programmable calibration of the SP237 devices. The TURCKs output 0-20mA, so the existing RW is expecting that input, the SP237s output 4-20mA so this must be adjusted, in the RW calibration for all the 0-10V signals

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Encoder Signals
The drawworks encoder and the pipe counters depend on more precise timing and thus require a splitter designed for this purpose. IN these cases, we ran the signals trough RIM-SS2 from dynapar. Encoder splitters

Digital Signals
The design was to use DPDT Relays to split the 24V pump stroke signals, which worked at lower pump speed for the Mud pumps, but counts were lost at higher speed cement pumping. We checked the frequency using an Oscope and found the higher speeds to be about 3 HZ for the Mud pumps and about 11 HZ for the cement pumps. The mechanical relays could not switch fast enough to keep up with higher rates. There were two extra channels in the encoder splitters, so I ran 1 each of the Mud and Cement pump signals through these, which fixed the issue. But two signals remained. This was fixed using Solid State relays which switch much faster and without contact bounce. These arrive on the next to last day, so I did not rewire the two channels going through the encoder splitters, but this could be down in the future for consistency. These were tested with a signal generator for proper counts in RW and IRIS software.

Wiring diagrams are pending while I complete drawings from hand notes, photos and sketches.

Gyro

I was able to test the Gyro at Sea, both live data and collecting data to a file. The live data appeared to be stable with very little drift, when not using a correction for earth rotation. The documentation clearly states that this correction is required for better accuracy. This needs to be researched more and look at possible bugs in the reader software. Testing was also done at dock side for comparison. Saved data has not yet been decoded and analyzed. But my opinion at this point, is that this gyro can be used for core orientation.