

Engineering Report

EXP 368P Dean Ferrell

VIT Software Bug Fixes and Requested Features

Labeling and Cosmetics

Labels on the pan and tilt indicators within the advanced interface were backwards, I changed the labels to match actual variables. I also made some graphical changes within the advanced interface to make the interface more user friendly and better organized.

Advanced Camera Commands

While attempting to add an infinity focus command to the advanced camera commands control, I found that this interface was not functioning. Apparently, this bug has been present and unnoticed for sometime. I fixed this bug but in the process decided to make changes to the way commands are loaded, which would allow an engineer to edit or add commands without the need to re-compile the LabVIEW software. The camera commands are now loaded from an external excel readable a comma separated value (*.csv) file spreadsheet, which is located in the application folder along with the VIT executable. The spreadsheet consists of two columns, column A being the list of text commands and column B being the corresponding HEX commands. If a text command is added, the corresponding HEX command must be entered in the same row of column B. The spreadsheet must then be saved as a comma separated value (*.csv) file. After making changes to this file, restarting the VIT software will load the new commands. This can be observed by invoking the advanced interface from the menu bar and looking at commands in the dropdown list under the camera advanced tab.

Infinity Focus

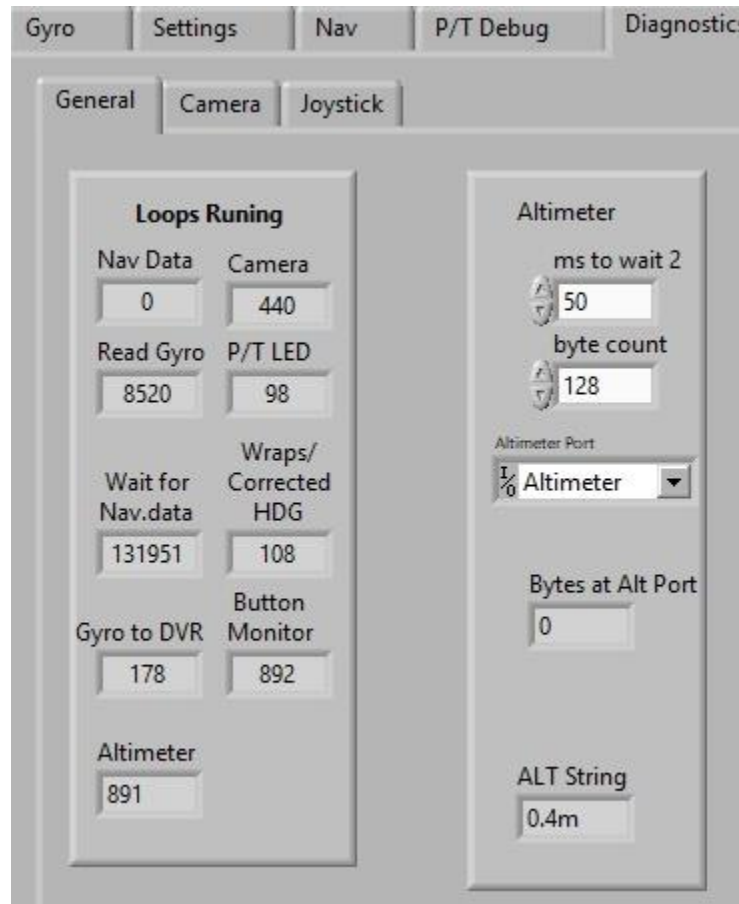
When the re-entry camera is in auto focus mode, the camera can get stuck focusing on near objects such as dirt on the pressure case lens. For this reason it was requested that the camera be set to infinity focus upon start up. Re-writing software to send start up commands to the re-entry camera automatically would be a daunting task given the current software design. Instead, I have set the default configuration of the re-entry camera to be manual focus and set the focus setting to infinity. This should stay the same unless someone changes these settings within the advanced camera commands selection. Any replacement camera would need to be set to manual focus and infinity and this configuration saved as the default.

I added the infinity focus command to the advanced camera commands list. I also added a button to the simple interface front page, which allows the user to change the focus mode to manual and set focus to infinity with one button press. Pressing the auto focus button will change the mode back.

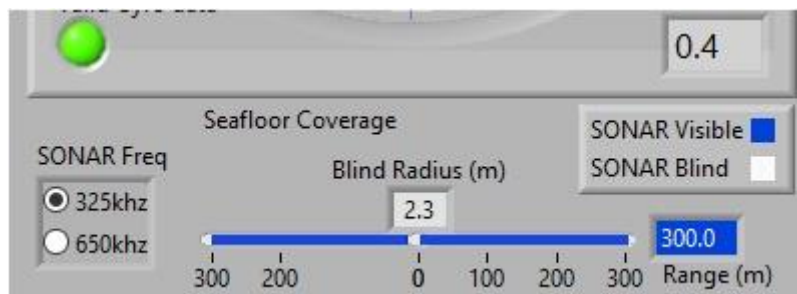
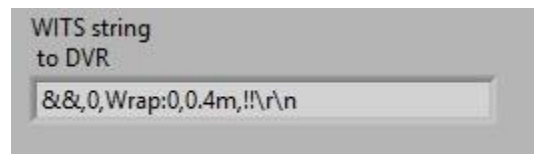


VIT Software Update to read Altimeter data

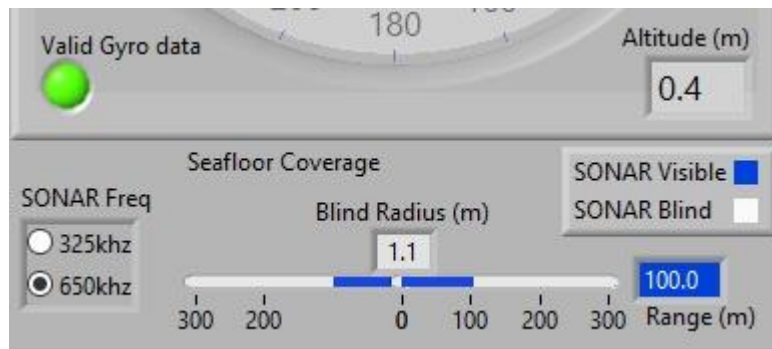
I added a communications loop to read data streamed from the altimeter on the Seaview system port ??, this port has been set to a VISA alias of "Altimeter" inside NI Measurement and Automation Explorer. The software is set to read up to 128 bytes or until a carriage return & line feed is found. The altimeter is factory set to stream lines of text with the attitude followed by "m" for meters and a carriage return & line feed.



The text is inserted into the WITS string which is sent to the DVR/Overlay via serial port. The DVR/Overlay was modified to display the altitude and the overlay setup was saved to file.

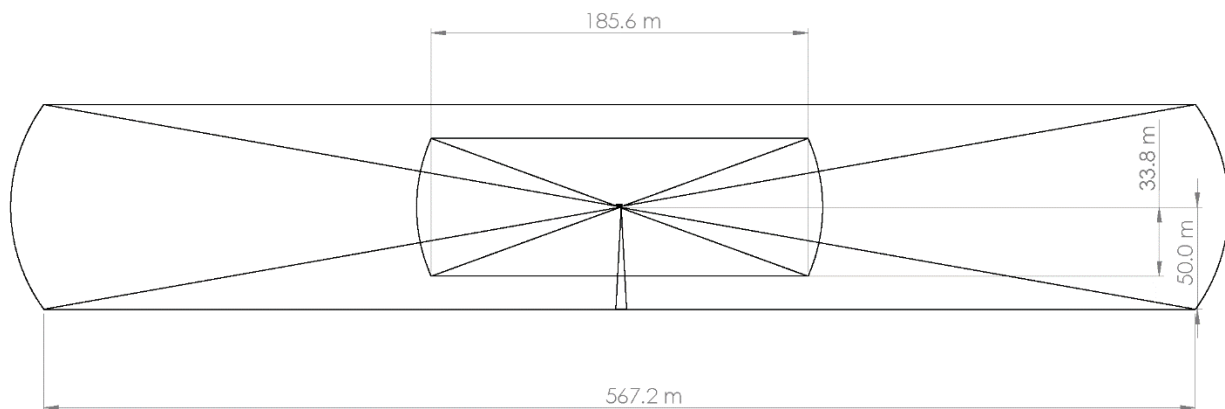


The text is stripped of the “m” and converted to a numerical variable. This variable is used then along with the selected frequency of the sonar to calculate the area of coverage for the sonar. The sonar frequency is selectable in the sonar software. The same frequency should be selected in the VIT software to display and accurate sonar coverage area. This display is to assist the operator in visualizing sonar coverage and does not affect the hardware in any way. There is a blind spot beneath the sonar which varies with the distance from the seafloor (altitude) and the beam width of the selected sonar frequency. 650 kHz frequency beam is 40° with a max range of 100m and the 325 kHz frequency has a beam of 20° and max range of 300m. Using this information the software calculates the Blind Radius which is the distance from directly below the sonar to the first point where coverage begins. The blue portion of the Seafloor Coverage display indicates the area of coverage of the sonar while the grayed out portion indicates non-coverage or blind spot. Blind spot is reduced the closer to the seafloor the



sonar comes.

As illustrated in figure 1, the 325kHz beam just begins to reflect the seafloor at its maximum range when the VIT is at an altitude of 50 meters. Any object within the 567 meter blind spot would not be reflected. IF using the 650kHz frequency setting, the blind spot beneath the VIT is smaller, but no seafloor reflection is seen until the VIT frame is within 33.8 meters of the seafloor.



Thoughts on Sonar Usage

First, As can be seen in figure 1, at an altitude above 50 meters there is no seafloor coverage for the sonar using the longest range setting of 325Khz. Lowering the VIT to within 50 meters of seafloor begins to reflect some objects on the seafloor, but there is still very little coverage and huge sonar blind spot beneath the VIT. I would be very easy to being overlooking a re-entry cone, even if it were located within the maximum range of the sonar. It is important to understand how the altitude and frequency

setting of the sonar effect coverage. Obviously the closer the VIT is to the seafloor, the better the coverage. Hopefully the addition of the altimeter will help the operator to get closer to the seafloor safely.

Second, sonar threshold needs to be adjusted so that we can see some seafloor reflection, while the gain should be adjusted to show some contrast between the soft reflection of the seafloor and hard reflection of the re-entry cone. I would think that these settings would vary based on the hardness of the seafloor. I would suggest that at the next opportunity, the VIT sonar be tested and settings adjusted while at a known location from a cone or other objects. This could be done just before a re-entry by offsetting from a visibly found re-entry cone a given distance which would fall within the sonar coverage area, then making gain and threshold adjustments. This way the operator could get a feel for how these settings work in our application.

Figure 1: Sonar Beam Coverage

Installation of Altimeter

The altimeter is mounted just below the re-entry camera to the rear vertical using a universal VIT mounting bracket. The location of this new mounting bracket was selected to maximize the distance from the drill string which in turn should minimize drill string reflection which could cause a false altitude. In this configuration reflection from the drill string should not occur when the VIT frame is within 30 meters from the end of the drill string or 30 meters altitude from the seafloor.

We were unable to physically test for drill string reflection, however we tested that the altimeter was functioning by lowering it into a 50 gallon trash bin filled with fresh water. The altimeter outputs 50m which is its maximum output when the device is in air. When lowered into the trash bin, the device outputs around .4m with some variation.

RIS data to LabVIEW

I modified the DOWComm Software to bring in RIS WITS data on the same com port as it transmits WITS data to the RIS computer. This is a first step in being able to format and disseminate RIS data outside of RigWatch.

The software seemed to work well on my laptop, however Krakatoa (the RigWatch master PC that normally runs DOWComm) is a 32 bit machine. Krakatoa must run a 32 bit Windows, because it runs RigWatch. My laptop where I made the development changes to DOWComm, runs 64 bit LabVIEW. I was unable to compile the software for a 32 bit machine. I am researching the best option for doing compiles for 32 bit machines.

Installation of new VIT PC

The DP PC was upgraded to new hardware and software as part of the lab stack wide machine and software updates. I installed an NI serial card in the new machine to match the old DP PC. The MCS found this NI card in their storeroom, however its packing material indicated it was purchased long

before the VIT NI card. There were spare cards purchased, so their location is unknown. I used this card in the new PC and later returned the card from the existing DP VIT-PC to the MCS.

I installed software, Sonar software, altimeter test software and recompiled VIT LabVIEW software for Win10 64 bit. The NI-MAX configuration would not copy over directly to the new PC, therefore I re-configured the NI-Serial card ports manually to point the correct VIT ports.