# Application Examples

# On the Wave Glider SV2/3 SMC



Revision: 1.2
Date: Oct 2015

| **Revision History** | |
|---|---|
| Rev 0.1 – 08/2013 | Initial Revision – B Kieft |
| Rev 0.2 – 02/2014 | Added CTD/Flourometer notes |
| Rev 0.3 – 03/20/2014 | Added enumeration notes |
| Rev 0.4 – 03/28/2014 | Added notes from LRI on various tasks |
| Rev 0.5 – 06/17/2014 | Added notes on GPS to SMC and thruster activation on SV3 |
| Rev 0.6 – 10/07/2014 | Addition of RTE activation |
| Rev 0.7 – 04/23/2015 | WGMS info |
| Rev 0.8 – 06/16/2015 | Added MMSI exclusion info |
| Rev 0.9 – 06/25/2015 | Operation Polygon info |
| Rev 1.0 – 10/21/2015 | Addition of Ethernet switch activation |
| Rev 1.1 – 10/22/2015 | Addition of cell modem power |
| Rev 1.2 – 10/28/2015 | EcoPuck on/off for SV3 |
| | |

This document rev resides here:
\\atlas.shore.mbari.org\ProjectLibrary\901310_WaveGlider_Feasibility\Docs\misc_docs

# 1. Scope

The intent of these notes are to provide a "cookbook" for various tasks that users have found necessary that may or may not be documented elsewhere. The information comes from personal experience as well as interactions with LRI.

# 2. Communications

## *2.1. Xbee link setup*

Using the Xbee link allows users to command and control the Wave Glider through WGMS. Commands and responses are routed through LRI's server via a VPN connection.

1.) Set up Open VPN with the following:

Reflector IP: 10.20.1.41
Reflector Port: 9748

Relay IP: 10.20.17.153
Relay Port: 9749

2.) Power up the Wave Glider
3.) Launch Open VPN and connect using the following credentials:
user: mbaritex
pwd: w650b42L
4.) Connect the Digi XBee Pro relay (ID: 4A16) to your local machine within range of thw Wave Glider. Make sure the PAN ID is set to the ID of the XBee Pro relay. Also set the reflector and relay addresses as shown above the first time you use the relay software.
5.) Start the relay and wait for a connection to the Wave Glider. You can open the debug console from the main page if desired.
6.) Open WGMS and verify that you see Xbee as a communications channel option.

## *2.2. Write Console Script*

This outlines the process of running a shell command on the SMC via WGMS.

1.) Open WGMS and select the "More Commands" link on the left side of the page
2.) Under the Command Type drop menu, select "Write Console Script"
3.) Board address is the address of the SMC to which you would like the command sent. This typically defaults to 0x2000 (decimal 8192). Enter decimal in the Board Address field.
4.) The function field will send the data back as payload if set to 0 (default) and a separate file if set to 1.

5.) In the script buffer field, add the command “runshell” ahead of any shell commands desired to be run. For instance, “runshell ls /home/smc” will display the contents of /home/smc.
6.) The payload response can be viewed in WGMS by selecting raw output from the blue start icon menu. Select the command ack and convert the hex payload data to ACII to view the response.

## 2.3. Running a Lua Script

Examples provided from Mike Cookson 5/15/2013 via Ryan Carlon

The example he is referring to uses a lua script called benthos.lua. It needs to be placed in the /home/smc/roots/200_LuaWrapper directory if you want to issue a command without a path. Otherwise, provide a fully-qualified path or a relative path from /home/smc/roots/200_LuaWrapper

> From Mike:
> <<<<
> You can execute commands remotely via WGMS using the Write Console Script command and citing the appropriate board address and function code. For example:
>
> The address for the lua interface is usually 0x2040 (8256) Setting the function code to 0 (default) means that the response will be sent as acknowledgments, which is suitable for small responses; if the response is expected to be large, you can set the function code to 1, which will return the response as a file transfer.
>
> Note that before executing anything, you have to load the script file (here I'm naming the script instance A; you can have multiple scripts running):
>
> ServerExec LuaWrapper 'lwm --loadlua benthos.lua A'
>
> You can likewise unload a previously-loaded instance:
> ServerExec LuaWrapper 'lwm --unloadlua A'
> >>>>

Then one can run commands in the Lua script.
ServerExec LuaWrapper 'lwscript --invoke A SendCmd ATS?'

or
ServerExec LuaWrapper 'lwscript --invoke A Listen1'

Note that for this to work, a few things have to be in order:

**First**, the service LuaWrapper must be enabled. This is most easily done by removing the .disabled file from /home/smc/roots/200_LuaWrapper and rebooting. Also, if one is using the example above, the BenthosModem process is likely also desired (~/roots/190_BenthosModem).
**Second**, the lua script calls out a specific configuration (config1 in this case). Be sure the calls to "sudo SetPowerSwitch" in the .lua script match the expected configuration. Also, make sure the configuration settings in ~/roots/200_LuaWrapper/LuaWrapper-config.xml match what is actually connected. Specifically in this case, the comms port.

# 3. Instrument Interfaces

Note: this section needs a great deal of updating.

## *3.1. Benthos Modem*

Running the driver
- remove .disabled file in /home/smc/roots/190_BenthosModem to enable the Benthos Modem service to run.
- To send a command to the driver, use ServerExec. For example "ServerExec BenthosModem 'BAM ON'" powers up the modem based on what power switch and uart are specified in the config file located in:
/home/smc/roots/190_BenthosModem/BenthosModem-config.xml

Lua Scripts
- remove .disabled file in /home/smc/roots/200_LuaWrapper to enable lua scripts to run
- Copy script (e.g. benthos.lua) to the /home/smc/roots/200_LuaWrapper directory
- To load a lua script: "ServerExec LuaWrapper 'lwm --loadlua benthos.lua A'"
    - This loads the script instance as "A"
- To unload a lua script: "ServerExec LuaWrapper 'lwm --unloadlua A'"

- To run a function in a previously declared lua script, use: "ServerExec LuaWrapper 'lwscript --invoke A SendCmd ATS?'" This example runs ATS? on the modem and returns the S register settings. Note that the modem needs to be powered on prior to running the above command.

- See the reference to config1 in the benthos.lua script. This references a configuration in the ./roots/200_LuaWrapper/LuaWrapper-config.xml file.

Config1...

5/29/13

Currently, running "ServerExec LuaWrapper 'lwscript --invoke A PowerOn'" is setting the power switch to 0x11 which is off. Investigating...

## 3.2. CTD and Flourometer

**Powering the payloads**

- If the CTD and Wetlabs flourometer are both installed, first power the sub payload (Wetlabs) and wait one Iridium cycle. Then activate the CTD payload. This will allow for proper enumeration of the sub SMC/Pcomm

**Running the instruments**

- In this example, payload #1 is CTD and payload SUB is the Flourometer.
- Both instruments need to be activated using a Write Console Script command. See above for specific details on selecting this type of command.

- To activate the CTD, send a write console script with buffer “ctd -r” to board address 257
- To activate the Flourometer, send a write console script with buffer “EcoPuck --run” to board address 12306

- To see that data is flowing back to shore, click “show system menus”->”vehicles” and expand the menu entitled “Sensor Data”. You should see both instruments and their associated samples there.

## 3.3. GPS from the VMC

**General Info**

- If GPS is desired on a SMC in a payload box there are a few options. Example 1 is for an SMC running software version 2.0 or prior. In that configuration, the GPS data is available on /dev/ttyS1 at 9600 baud for the SV3 and 4800 baud for the SV2. When a payload is connected via a Sensor Port (connectors S1-S3) the GPS feed is always included on the aforementioned serial port. This information is provided per a discussion with Mike Cookson of LRI.

**Example 1**

- To view GPS data on the serial port:
    - stty –F /dev/ttyS1 9600 raw -echo
    - cat /dev/ttyS1

and the data stream should be visible on the serial port.

**Example 2**

- To enable GPSListener at startup to log its data to a file:

**ServerExec GPSListener 'GPS DEFAULTOUTPUT /mnt/XDATA/GPS/gpsdata.txt'**
**ServerExec GPSListener 'GPS AUTOSTART true'**

**ServerExec GPSListener 'GPS OUTPUT /mnt/XDATA/GPS/gpsdata.txt'**
**ServerExec GPSListener 'GPS START'**
**ls -l /mnt/XDATA/GPS**

- For the above to work the GPSListener service needs to be running at startup (.disabled file removed) and the GPSListener-config.xml file needs to be populated with the correct serial port and baud rate.

## *3.4. Eco Puck (SV3)*

**Powering the payload on/off via WGMS**

- **To power on**:

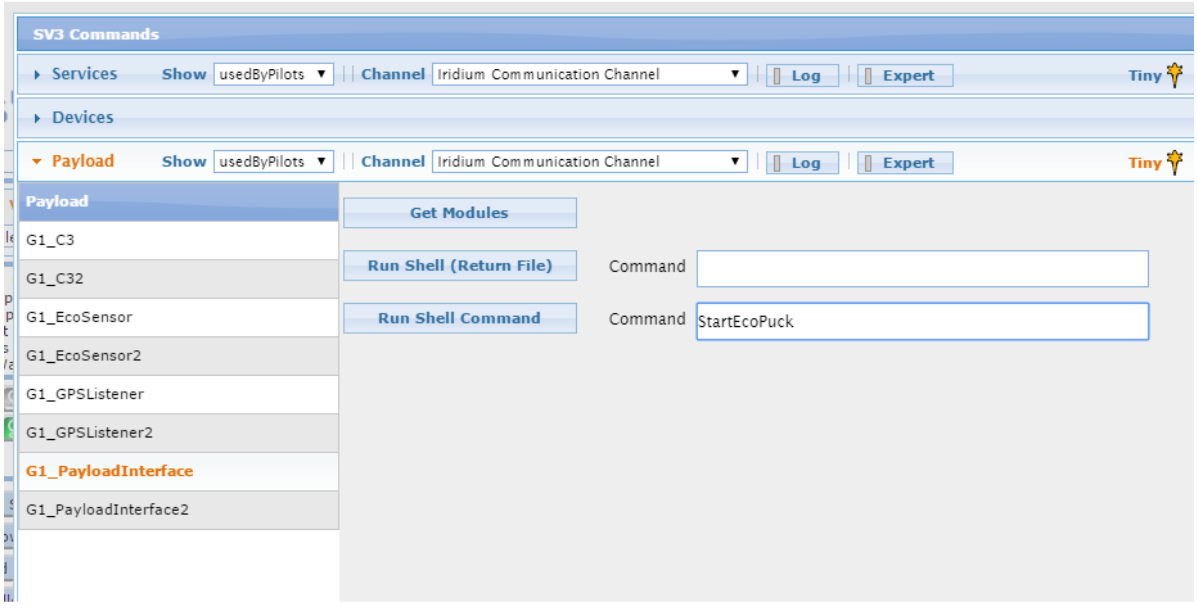
First, make sure the Ethernet switch is turned on (see section in this document).

1.) SV3 Commands -> Devices-> G1 -> Turn on Integrator Payload. Then wait for the ACK.

2.) Wait for message in "Tiny Commands" window pane that confirms the SMC has booted. For example:

PyldInt-0x3332470932363032002b0025 PDC Rebooted @ 2015-10-28T21:51:32Z, Reason=0x0f000000, Last Tick was 0x0000000000000000, ResetCodes=....., ....., ....., ....., ....., ....., ....., ....., , Current ELDB=0x000014d8

3.) SV3 Commands -> Payload-> G1_PayloadInterface -> Run Shell Command
Enter "StartEcoPuck" in the text field and press Run Shell Command (see below).




- **To power off**:

1.) SV3 Commands -> Devices-> G1 -> Turn off Integrator Payload. Then wait for the ACK.

- To see that data is flowing back to shore, click “show system menus”->”vehicles” and expand the menu entitled “Sensor Data”. You should see both instruments and their associated samples there.

# 4. Some useful commands

## *4.1. sudo SetPowerSwitch 1 1*

Note that the silkscreen starts with power port 0. The software does not. They are numbered 1-4. Thus “sudo SetPowerSwitch 1 0” turns power off on port 1.

## *4.2. ServerExec PayloadInterface dump*

Lists all payloads and their address

## *4.3. ServerExec PayloadInterface getmodules*

Lists all loaded modules as well as the address of the board.

```
smc@dm3730_torpedo:~$ ServerExec PayloadInterface getmodules
Address  Readable Name
-------  -------------
0x20F3   BenthosModem
0x2040   LuaWrapper
0x2000   PayloadInterface
0x2012   EcoSensor

My board address = 0x2000
Default board ID = 0x20
```

## *4.4. sudo Enable Ethernet*

Activates Ethernet and dhcpcd. There is no network activation upon normal boot.

## *4.5. Enumeration Delay (write console script)*

NOTE: This command has only been run on the SV3
You can set the enumeration delay with the following write console script (without quotes) to board address 0: "%payloadPort#.setEnumerationDelay(milliseconds)", where # is the payload number (1-3).

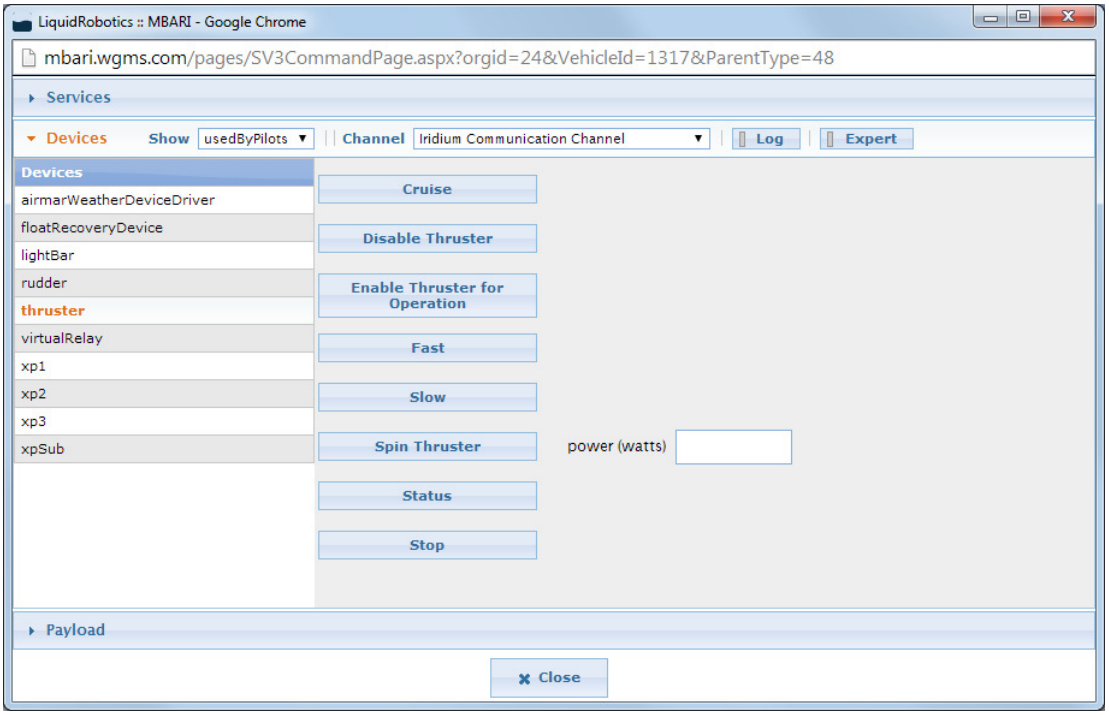
Here's an example to set payloadPort1's delay to 120 seconds:
"%payloadPort1.setEnumerationDelay(120000)".
This setting will persist, even after a float reboot.

## 4.6. Float Reboot

NOTE: This command has only been run on the SV3
To reboot the VMC, click:
More Commands -> Command Type -> System/Float Reboot

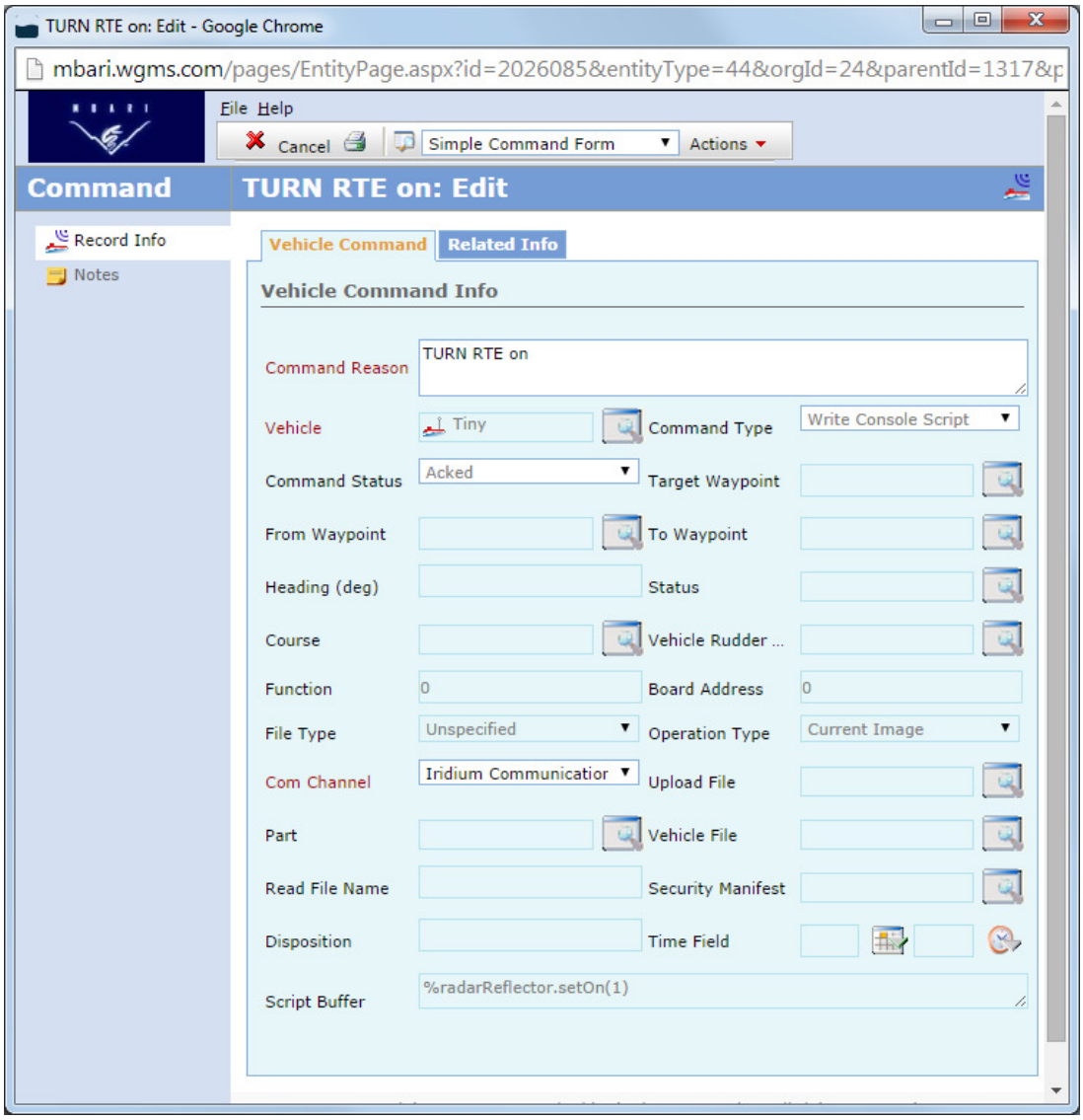
## 4.7. Thruster Activation

NOTE: This command has only been run on the SV3
In WGMS click “SV3 Commands” and then select the horizontal “Devices” tab (second from the top. From there, various commands including “fast”, “slow”, and “disable” can be issued to the SV3.




## 4.8. Radar Target Enhancer (RTE) Activation

NOTE: This command has only been run on the SV3
In WGMS select “more commands” and then select a “write console script” for the command. The console script shown below turns the RTE on. To turn back off, simply use %radarReflector.setOn(0) in the buffer.



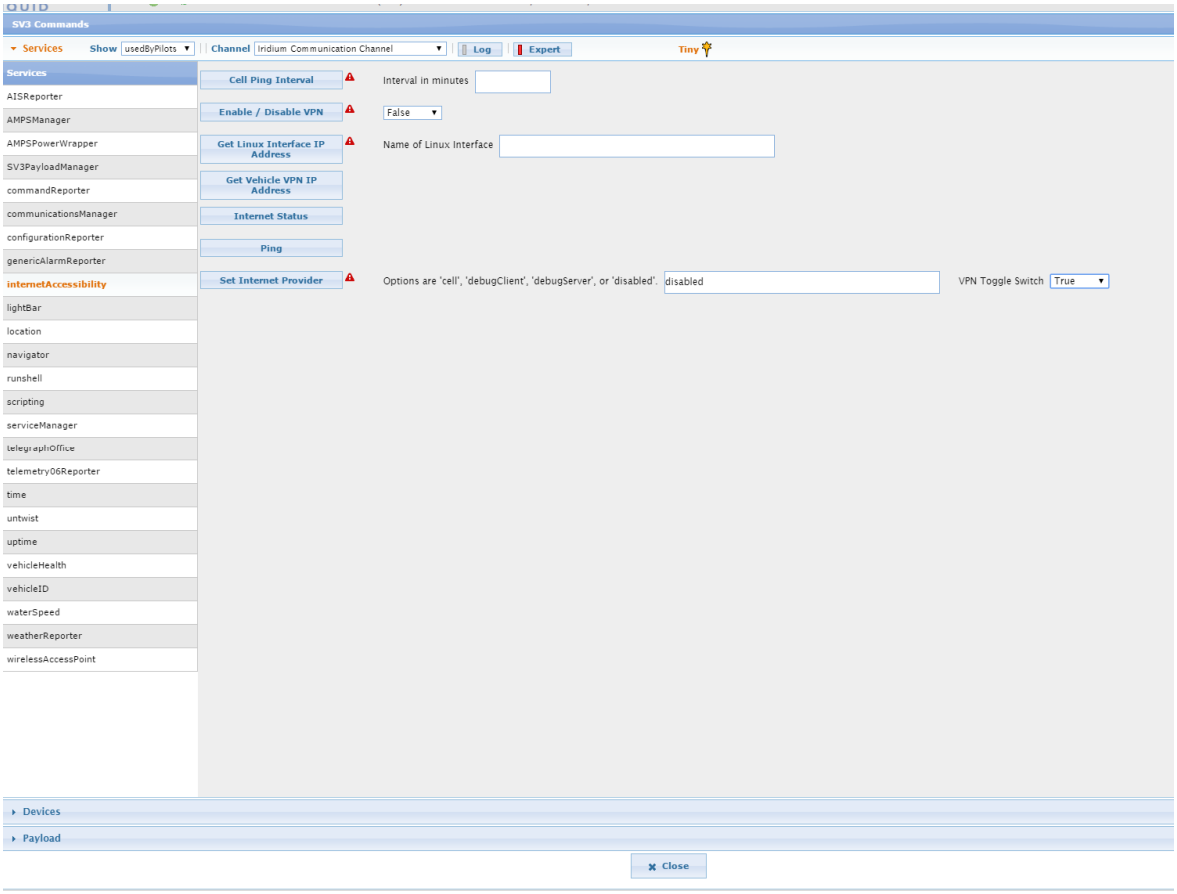

## 4.9. Ethernet Switch Activation

If additional SV3 power savings is required, the Ethernet switch may be powered down to save approximately 2 watts?(savings not confirmed at time of writing). Using the above console script method, issue the command "%ethernetSwitch.setOn(0)" to turn off the switch and "%ethernetSwitch.setOn(1)" to turn it on.

## 4.10. Cell modem Activation

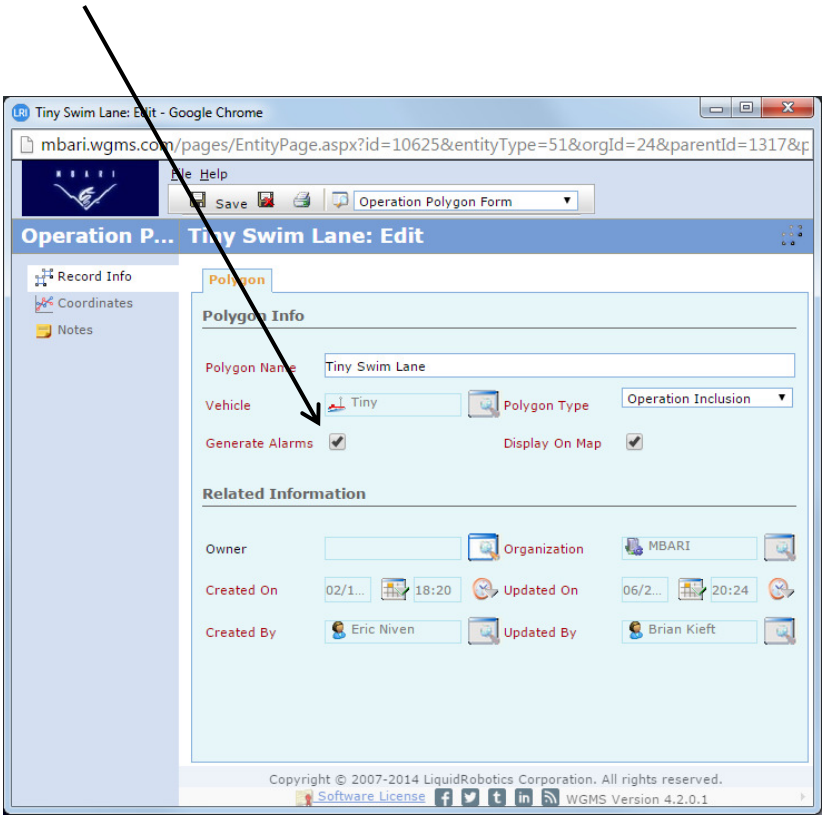
If it is desired to disable the SV3 VR cell modem, go to SV3 Commands. Choose "internetaccessibility". Choose the "Expert" button at the top of the screen. Under "Set

Internet Provided" type in disabled. Select "true" for VPN toggle. Then click "Set Internet Provider"




## 4.11. Operation Polygon Alarms

In WGMS click the vehicle icon (color/shape may vary) and select "Operation Polygons" from the menu on the left. From there, double click the polygon of interest (or add one if you need to) and select the "Generate Alarms" checkbox.




# 5. Where to find data

## *5.1. Enumeration Information and Board IDs*

Q: **How exactly do we see the "System info data" panel, i.e. the one that shows "Board ID"?**

***A:*** *From the vehicle's screen, click "Show system menus", then click the System tab that appears on the left. Under the newly displayed menu tree, click the System Info Data item, and the records are displayed in the main view.*

Q: **How does "Board ID" correspond to board address, i.e. how to compute board address of 8192 given board ID of 32?**

***A:*** ***Board ID*** *is the upper 8 bits of the* ***Board Address****; each CPU that is interfaced through the payload protocol must have its own unique* ***Board ID****. The lower 8 bits of the* ***Board Address*** *are known as the* ***Task ID****, and are meant to further subdivide the target CPU's address space so that Write Console Script can target different functions and payload telemetry can be attributed to different functions.*

*So a* ***Board ID*** *of 32 (0x20) results in base* ***Board Address*** *of 8192 (0x2000) -- 32*256 = 8192*

*The PIB uses **Task ID** 0 for its configuration and status routine, and then 1-3 correspond to the functions running on each of its personality modules.*

*The SMC uses different **Task ID** numbers for each CORBA server. For example, **Task ID** 0 is the PayloadInterface process, 16 (0x10) is the first ADCP process, 18 (0x12) is the first EcoPuck process, etc.*

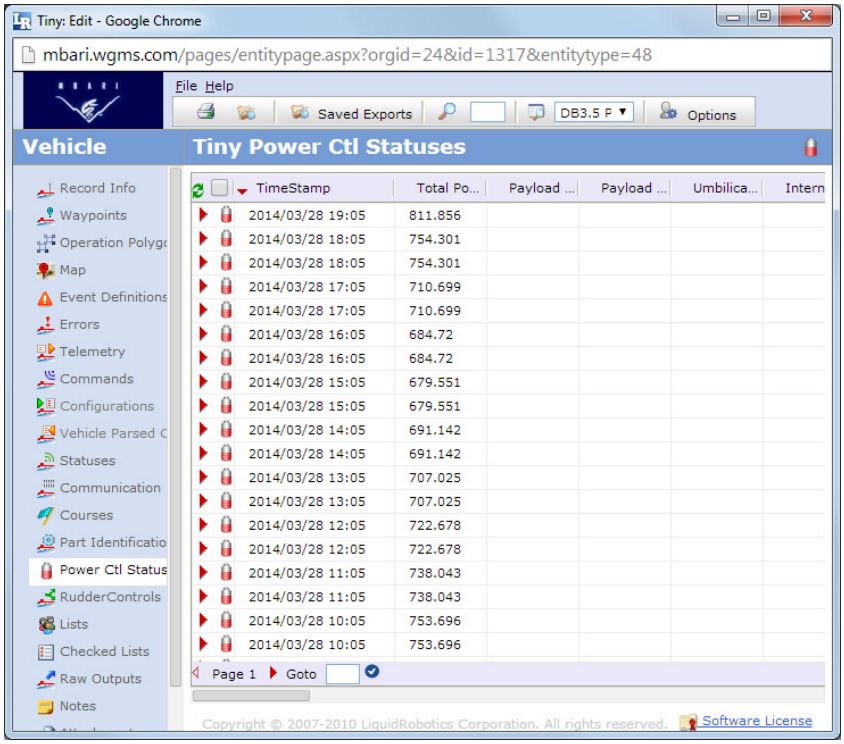
Q: **Can we force a re-enumeration?**

***A**: Through the VMC web site, you can pull down the Operate menu and select SV2 Payloads. That page shows the current enumeration status for each payload port and allows the option to simply re-enumerate by pressing the Enumerate button.*

*The traditional way to re-enumerate is to issue a second payload power on command without first powering off. I suggested the sequence I did because it seemed to me that something was operating incorrectly and I wanted to clear the current state.*

## 5.2. Battery Capacity on SV3 Information and Board IDs

Click the vehicle icon  and then click Power Ctl Status to display the total power remaining in Wh.

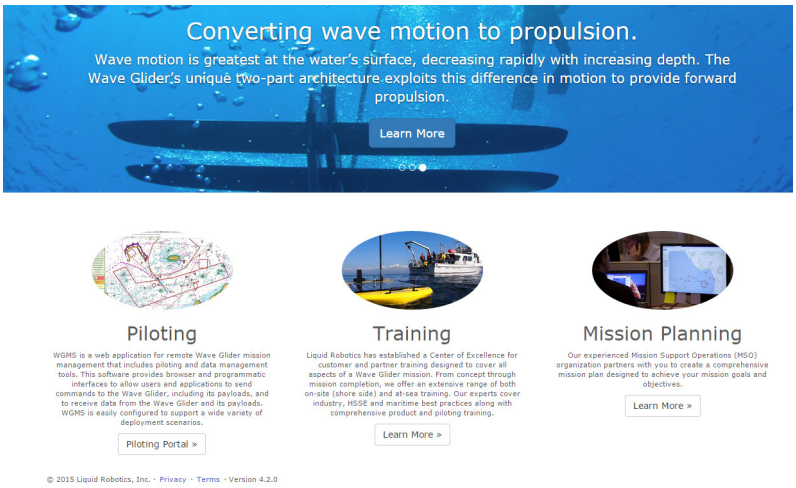


# 6. Piloting Access (WGMS)

## *6.1. General Account*

A multi-user account has been set up under the name William G Waterman. WGMS credentials are as follows:
user: TBD
pwd: TBD
Email is directed to wgwaterman@listserve.mbari.org and users standing watch can subscribe to this list and forward escalation messages to their SMS gateway address as desired.

Login via WGMS:
https://mbari.wgms.com




And click on Piloting for the piloting portal.

# 7. MMSI Exclusions

Sometimes a Waveglider will be operating in close proximity to a known vessel and it becomes necessary to disable proximity/path alarms for that vessel. Below is the description from Marc (LRI support) on how to disable a specific MMSI.

1) First get the MMSI from the AIS display and then click the link in the bubble to access Marine Traffic info screen. [*Editor's note: or simply look up the MMSI using other methods besides WGMS*]

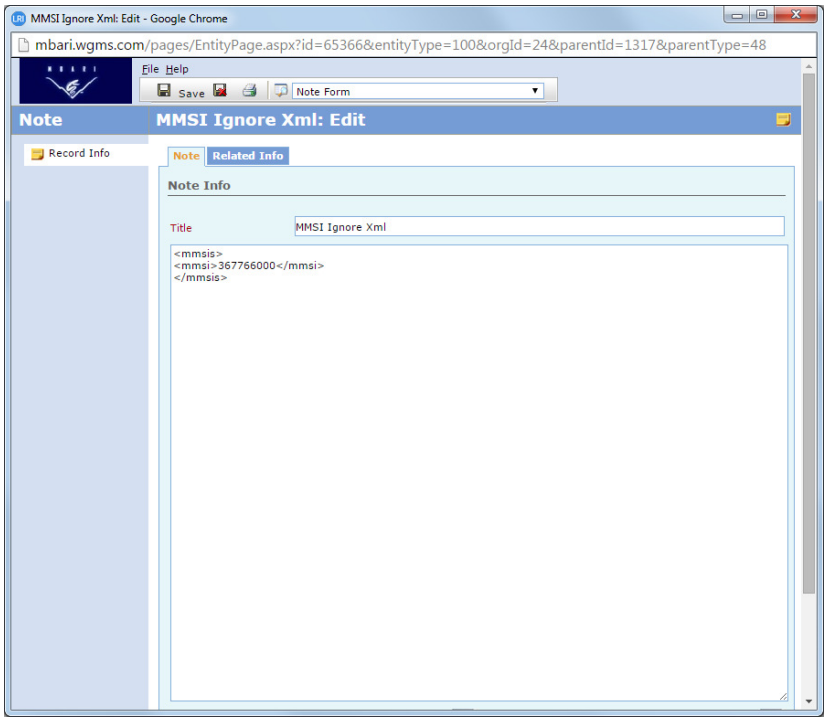
2) Next open the WGMS vehicle form and navigate to the Notes section
3) Editing notes that are displayed in Html Editor
   a. If the vehicle already contains a note titled: "MMSI Ignore Xml" then open it otherwise create a new note and name it "MMSI Ignore Xml"
   b. Most orgs will display note forms that contain an HTML editor. To add the necessary Xml you will have to use the view/Edit Source button to enter the text
   c. Type in the following text:

   <mmsis>
   <mmsi>XXXXXXXXX</mmsi>
   </mmsis>

   where XXXXXXXXX is the MMSI of the target vessel.

   d. And then click ok and subsequently save and close.

4) Editing notes that are displayed in Text Editor
   a. Notes with text editor will allow you to edit the xml directly in the description field of the note.
   b. Click save and close to accept the changes
5) To add multiple MMSIs to the list you will have to add those individually to the MMSI Xml in the following way:
   <mmsis>
   <mmsi>vessel 1 mmsi</mmsi>
   <mmsi>vessel 2 mmsi</mmsi>
   <mmsi>vessel 3 mmsi</mmsi>
   </mmsis>
6) Each vehicle will have its own version of the list, and once defined the vessel listed will be ignored until it is removed from the note Xml.


MMSI Ignore Xml: Edit - Google Chrome
mbari.wgms.com/pages/EntityPage.aspx?id=65366&entityType=100&orgId=24&parentId=1317&parentType=48
File Help
Save
Note Form
Note
MMSI Ignore Xml: Edit
Record Info
Note
Related Info
Note Info
Title
MMSI Ignore Xml
<mmsis>
<mmsi>367766000</mmsi>
</mmsis>