Slocum G2 Glider Operators Training Guide

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A Teledyne Technologies Company

Training date: _____

Book owner: _____

Notes:

Contents

Introduction

This document is a field guide and reference documentation for use in preparing and deploying Teledyne Webb Research's Slocum G2 Gliders.

Please also refer to the complete *Slocum Glider Operators Manual* at:

ftp://ftp.glider.webbresearch.com/glider/windoze/production/src/doco/MANUAL/

The site above is an authorized user restricted site. To request access, contact:

glideraccess@webbresearch.com

For technical glider assistance, contact:

glidersupport@webbresearch.com

Glider Operation and Maintenance Training

Only trained and qualified personnel should operate and maintain the glider.

Teledyne Webb Research conducts regular training sessions several times a year. Glider users should attend a training session and understand basic glider concepts and terminology. Contact glidersupport@webbresearch.com for information about training sessions. Our company's policy is to fully support only properly trained individuals and groups.

Only personnel who have attended a Teledyne Webb Research training session should use this document.

Internet Resources

Sign into access restricted glider documentation at:

https://dmz.webbresearch.com

Slocum glider users forum

https://datahost.webbresearch.com/

Software distribution:

ftp://ftp.glider.webbresearch.com/glider/

Slocum Glider Operators Manual:

ftp://ftp.glider.webbresearch.com/glider/windoze/production/src/doco/MANUAL/

GMC Users Guide (Dockserver Manual):

ftp://ftp.glider.webbresearch.com/glider/windoze/production/src/gliderMissionControl/Documentation/gmcUserGuide.pdf

Windows executables (In the URL below, access the Linux files by replacing *windoze* with *linux*.):

ftp://ftp.glider.webbresearch.com/glider/windoze/production/windoze-bin/

Glider service bulletins:

ftp://ftp.glider.webbresearch.com/glider-service-bulletins/

Updated glider code procedure:

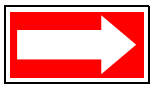
ftp://ftp.glider.webbresearch.com/glider/windoze/production/src/doco/software-howto/updating-all-glider-software.txt

Masterdata:

ftp://ftp.glider.webbresearch.com/glider/windoze/production/src/code/masterdata

Notes and Warnings

Where applicable, special notes and warnings are presented as follows:



NOTE A referral to another part of this manual or to another reference; a recommendation to check that certain criteria are met before proceeding further in a step or sequence; or general information applicable to the setup and operation of the Teledyne Webb Research Slocum G2 Glider.

CAUTION A reminder to follow certain precautions in order to prevent damage to equipment or injury to personnel.

WARNING A reminder that dangerous or damaging consequences could result if certain recommended procedures are not followed.

Format Notes

Glider sensors and commands will be denoted in the Courier font throughout this document, as shown in the example below:

Typing `Report ++ m_roll` will report measured roll (`m_roll`) every CPU cycle.

When this handout is displayed on a PC, some areas will be hyperlinked to information available on the Internet, such as:

http://www.webbresearch.com/

and protected documents by permission:

http://www.glider.webbresearch.com/

Many of the links and the code mentioned in this manual require access by prior arrangement. Please contact glidersupport@webbresearch.com to inquire about access to these protected documents.

Customer Service

We welcome your comments and suggestions for improving our products, documentation, and service of the glider system. Please contact Glider Support should you have any comments or suggestions about this manual, the glider system, or if you require service or support.

Please contact us at:

82 Technology Park Drive
East Falmouth, MA 02536

Telephone: +1 (508) 548-2077
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E-mail: glidersupport@webbresearch.com

www.webbresearch.com

Notes for Ballasting and Lab Tests

The glider must be sealed with an appropriate vacuum before power can be applied to it. To do this, pull the glider together with the tie rod using the provided 24” T-handle hex wrench until the hulls have come together. Set the torque to 15 in-lbs using the provided torque handle and extension. With the vacuum tool, torque handle, and extension, put a vacuum on the glider. For shallow gliders, your target is 6" Hg (1000m gliders require a vacuum of 7” Hg), ±0.2” Hg, but it is best to target a vacuum higher than this as you can bleed some off when the glider is powered on.

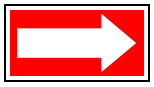
CAUTION Experience glider users will regularly power the glider without the cowling installed. There is a risk of overinflating the air bladder if the cowling is not in place during the start up sequence. The air pump must be turned off before the this happens. It is suggested that until users are familiar with the start up sequence and gaining control of the glider that they install the aft cowling before power up.

Once the vacuum has been pulled and the MS plug is in place, you may apply power. The glider will go through its normal start up routine. When you see

```
SEQUENCE: About to run initial.mi on try 0
```

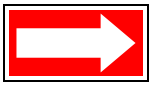
you must type `ctrl-C` within 120 seconds to terminate the sequence. This will give you a `GliderDOS` prompt. From the `GliderDOS` prompt, follow these instructions:

1. Type `callback 30`. This will hang up the Iridium phone for 30 minutes. You can enter any value for callback from 1 to 30. Alternately you can type `use - iridium` to take the iridium out of service until you are done with your testing.



NOTE If the iridium phone is disabled by typing `use - iridium`, remember to type `use + iridium` when the ballasting procedure is complete.

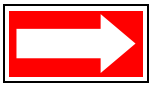
2. Type `lab_mode on`. This puts the glider in lab mode and will prevent the glider from trying to run its default mission.



NOTE The 1000m pump can take several minutes to retract from fully displaced to 0 cc displacement. If a user would like to monitor the retract of the deep pump type `report ++ m_de_oil_vol`.

3. Type `ballast`. This deflates the air bladder, sets the pitch motor and buoyancy pump to zeroed positions.
4. Type `report ++ m_vacuum`. This displays the vacuum inside the glider every time the sensor updates. If the vacuum is already at 6" Hg (7" Hg for 1000m), ±0.2” Hg, you are done. If not, you need to adjust the vacuum.
5. Type `report clearall`. This stops outputting the vacuum value.
6. Put the aft cowling on the glider. If the glider is connected to an external power supply, it will be necessary to power down by typing `exit` and disconnect the power supply before installing the cowling.
7. Repower, if necessary, and follow steps 1-3. You are now ready to put the glider into the ballast tank.

WARNING Do not place the glider in the ballast tank unless either a red stop plug or a green go plug has been installed.



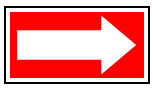
NOTE If any device is removed from service during the time the glider is in the ballast tank the glider will move the buoyancy engine to full displacement. This will result in incorrect ballasting. The most common reason for this is the attitude sensor being taken out of service due to local magnetic fields. A user should periodically check that all devices are in service by typing `use`. f a device is out of service the user should determine if it is critical for ballasting and type ballast again when satisfied that the required devices are in service.

8. You will need to get CTD data from the glider so that you can calculate the weight adjustment necessary to go from the ballast tank to target water conditions. To do this, turn on all sensors in the science bay by typing

`loadmission sci_on.mi` (if available), or type the individual commands listed below:

- `put c_science_all_on 0` (off = -1). Tells the science computer to sample all science sensors as fast as possible.
- `put c_science_on 3` (off = 1). Displays that data to the screen.
- `put c_science_send_all 1` (off = 0). Sends science data to the flight Persistor.

9. Make a note of the water temperature and conductivity. Enter this data in the tank conditions section on the Ballast sheet of the GBPSH (Glider Ballasting Procedure Spreadsheet). To ballast for tank conditions, copy the values from the tank conditions section into the target conditions section. Type `loadmission sci_off.mi` to turn off the science sensors or use the three commands indicated above.
10. Attach a suspended scale to the glider 1” from the forward edge of the forward hull and another suspended scale 1” from the aft edge of the aft hull. Let the glider settle in the tank before taking readings from the forward and aft scales.

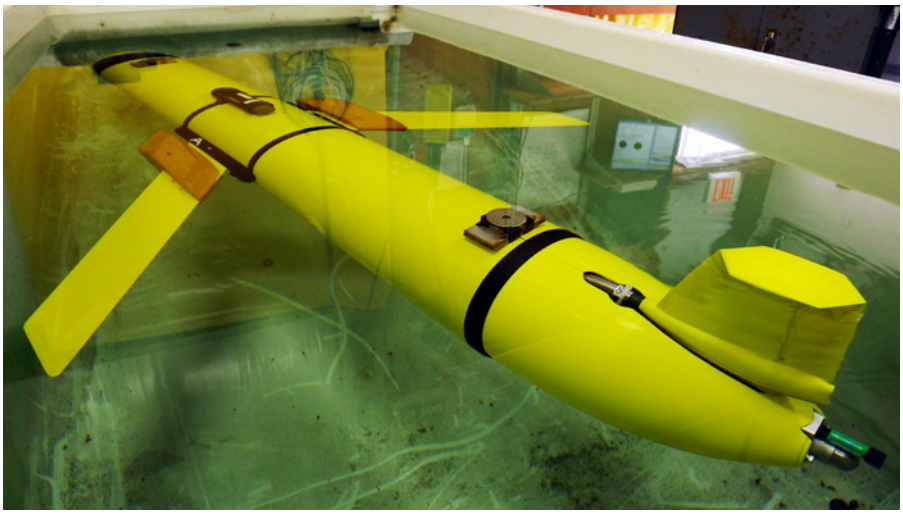


NOTE If the glider does not sink in the tank, it may be necessary to remove it so that more weight can be added internally. Advanced users can use external weights and scale factors to account for the density of the weights in water.

11. Enter the scale weights from step 9 in the “Scale Readings” section of the correct sheet of the GBPSH, i.e., G1 Shallow, G1 Deep, or G2 Deep & Shallow. Use the Weight Adjustment section of that sheet to determine what weight changes must be made in the glider. Remove the glider from the water and type exit to turn off the glider. Dry thoroughly before opening to make weight changes.

CAUTION TWR recommends Instant Ocean® for providing an ocean equivalent conductivity. Note that other methods of adding salt/salinity will not provide a correct conductivity and can result in incorrectly ballasted gliders

12. Repeat steps 10-11 until the glider is perfectly ballasted in the tank. The fin should be just breaking the surface at this point. The image below illustrates a glider perfectly ballasted for the tank.



NOTE It is only necessary to calculate the H-moment if substantial changes have been made to the glider's ballasting since its H-moment was previously calculated.

13. To calculate the H-moment with the glider neutral in the tank, type `report ++ m_pitch m_battpos`. This displays the pitch and the position of the pitch battery of the glider in radians and inches respectively every time the sensor updates. Follow instructions for calculating the H-moment in the Calculating H-Moment (Pitch Battery Method) section of the Ballast sheet. When done type `report clearall`.
14. Enter the temperature, density and salinity for your target location in the Target Water section of the Ballast sheet to get your total weight change from tank conditions to target water conditions. Use the appropriate sheet, i.e., G1 Shallow, G1 Deep, or G2 Deep & Shallow, from the GBPSH to determine the necessary internal weight change.
15. Open glider to adjust the internal weight for the target water conditions.
16. Once final weight adjustments are made, the 4095-FCP functional test procedure should be performed on the glider to confirm that all components are operating normally. Please contact glidersupport@webbresearch.com and request the newest revision of this test procedure.

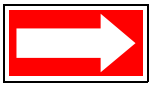
Common Lab Commands

To do this:	Type this:
Exit lab mode	While in `lab_mode on`, type `lab_mode off`. **NOTE: Never launch the glider in `lab_mode`.**
Zero motors and deflate the air bladder	`ballast` **NOTE: Never launch the glider in `ballast`.**
Stop Iridium phone calls	`Use - iridium` or `callback 30` **NOTE: Never type use - iridium when in water**
Report a sensor as fast as possible	`Report ++ (any_masterdata_sensor)` `Report ++ m_battery`
Change a sensor	`Put (any_masterdata_sensor)` Example: `Put c_fin 0` zeroes the fin after a wiggle.
Turn off all reporting	`report clearall`
Exercise the ballast pump, pitch motor, and fin motor	`wiggle on`
Stop exercising the motors	`wiggle off`
Tell the science computer to sample all science sensors as fast as possible	`put c_science_all_on 0 (off = -1)`
Display that data to the screen	`put c_science_on 3 (off = 1)`
Send science to the flight Persistor	`put c_science_send_all 1 (off = 0)`
Apply power to the glider in an open state (no vacuum)	Follow these steps before powering down and opening the glider: • Type `exit pico`. This will bring you to a PicoDOS prompt. • Type `boot pico` to set the glider to boot into PicoDOS. If the ballast pump is already all the way forward or the pump is unplugged the application can run on the bench without a vacuum. Running the ballast pump without a vacuum can damage the forward rolling bellafram. • Type `app -lab` from PicoDOS to enter straight into lab_mode on. When you are finished, close the glider, apply the vacuum, and type boot app to set the glider to boot the application. You must always make sure the glider is set to boot app before doing any in the water tests.
Cycle default settings	`Exit reset`
Remove green plug or power supply; install red plug	`Exit` and wait for the prompt

Pre-mission Checkouts

These procedures should be followed to qualify a glider so that it can be launched for a mission. TWR can provide current Functional Check Out Procedure and Pre-deployment test procedure by request to glidersupport@webbresearch.com

On the Beach, Deck and/or outside at the Lab



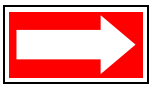
NOTE When a glider is qualified on the beach, deck, and/or at a lab, it must be outside with a clear view of the sky.

1. Power on the glider.
2. When prompted, type `control-C` to exit to GliderDOS.
3. From the GliderDOS prompt, type `callback 30` to hang up the Iridium phone.
4. Type `Lab_mode on`.
5. Type `put c_gps_on 3`.
6. Confirm the GPS.

   In the string like the following the highlighted A should turn from a V to and A.

   ```
   gps_diag(2)cyc#:538|GPRMC,161908,A,5958.3032,N,
   7000.5568,W,0.000,343.9,190808,0.3,W|
   ```

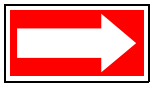
   After a number of A responses, type `put c_gps_on 1` to stop the screen display.



NOTE For best possible timing accuracy a user may choose to issue the command `sync_time`.

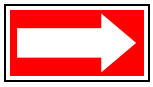
7. Type `wiggle on` and run for 3-5 minutes for shallow pumps to check for any device errors or other abnormalities. For deep pumps `report ++ m_de_oil_vol` and ensure full retraction and extension (+/- 260 cc). Type `wiggle off` to stop wiggling.
8. Type `Report ++ m_vacuum`. (Remember, the vacuum can fluctuate with the temperature.)

9. Type `Report ++ m_battery`.
10. Type `report clearall`.
11. If no errors are found, type `lab_mode off` to return to the GliderDOS prompt.



NOTE Make sure that the glider is not simulating or in boot Pico or lab mode before deployment.

12. Purge the log directory, and send the logs over FreeWave or `dellog all` on both glider and science persistor. (This can take a long time if there are a large number of files and they will be lost, so the best practice is to purge and archive the log files in the lab.)
13. Type `run status.mi` and confirm that all sensors are being read. The mission should end with this message: “mission completed normally.”



NOTE The following sensor may not update during running status.mi (this is OK): `surface_2: Waiting for sensors to report. ERROR behavior surface_2: Timed out waiting for input sensors:ERROR behavior surface_2: Sensor NOT reporting: m_raw_altitude`

14. Let the glider connect to the Dockserver and send .sbd over Iridium, If not connected, type `Callback 1` to force the Iridium to call in one minute once connected.

    Here is an example of forcing Iridium while the FreeWave is present:

    GliderDOS I -3 >`send -f=irid *.sbd -num=2` (This sends the two most recent .sbd files over Iridium. Be patient, because the Iridium is slow, and currently there is no positive feedback over FreeWave).

Science Sensor Checkout

1. Type loadmission `sci_on.mi` and loadmission `sci_off.mi` if available or follow the individual commands below
   - Type `put c_science_all_on 0 (off = -1)`. This tells the science computer to sample all science sensors as fast as possible.

- Type `put c_science_on 3 (off = 1)`. This displays that data to the screen.
- Type `put c_science_send_all 1 (off = 0)` to send science to the flight Persistor.

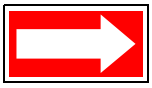
2. Verify that science output seems reasonable for all sensors installed. TWR can provide check out procedure for many sensors by request to glidersupport@webbresearch.com

Transporting the glider

1. Ensure that all of the cart and crate straps and locks are used, and/or load the glider into the boat and proceed to the first waypoint or deployment location. See the sections, "Deploying the Glider" on page -13 and "Recovering the Glider" on page -16. Just prior to deployment install wings and ensure green plug is seated well and tucked into cowling

In the Water

1. Attach a 10 meter line, preferably neutrally buoyant line, with a buoy to the glider before putting it in the water. If you have **great confidence** in the glider's ballasting you may choose to not test on the line.
2. Once the glider is in the water, type `run status.mi` again.
3. Run ini0.mi per below. If further evaluation is required run **one** or more of the following missions while on station until satisfied that the glider is ballasted and operating normally.
   - `Run Ini0.mi`—Does a single yo to a maximum depth of 3 meters and a minimum depth of 1.5 meters. This uses a fixed pitch battery and fin position.



NOTE The glider pilot should be evaluating the data from ini missions to ensure that glider ballasting looks correct and that the system is functioning normally. Proper ballasting has symmetrical dive and climb profiles. When possible it is recommended that the deployment crew stay on location and wait for confirmation from the pilot that the data looks ok. Strong winds or less than neutral line attached to a buoy can skew the dive and climb profile results, for this reason an ini0.mi is usually run on and off the buoy

- `Run Ini1.mi`—Does 3 yos to the north, diving to 5 meters and climbing to 3 meters. The pitch should be +/- 20 degrees.
- `Run Ini2.mi`—Goes to a waypoint 100 meters south of the dive point, diving to 5 meters and climbing to 3 meters. The pitch should be +/- 20 degrees.
- `Run Ini3.mi`—Goes to a waypoint 100 meters north of the dive point, diving to 5 meters and climbing to 3 meters. The pitch should be +/- 20 degrees.

4. Send the files locally and/or by Iridium. Confirm the flight data and desired flight characteristics of ini missions run. If necessary, turn flight control over to the Dockserver over Iridium.
5. ***If you have not removed the buoy and the line from the glider, do it now.***
6. From the GliderDOS prompt, type `exit reset`. This forces reinitialization of all of the sensor values.
7. When the glider reboots, type `control-C`, when prompted, to bring up the GliderDOS prompt. Then type `loadmission waterclr.mi` to zero any built-up water currents that are remembered long term.
8. Type `run stock.mi` or the equivalent `.mi` to begin the desired mission.

Deploying the Glider

Deployment at sea can be dangerous, and the welfare of crew and glider handlers should be considered while at the rail of a ship. From a small boat the glider cart can be used to let the glider slip easily into the water. Remove the nose ring quick pin and let the ring fall forward, if necessary entirely remove nose ring. Un-clip the fastening strap from the center section of the cart/glider before deployment.

For larger boats, the pick point affixed to the payload bay can be used to lower and raise the glider with a crane or winch from the vessel to the water.

Glider with the Buoy and Rope Ready for the First Deployment

NOTE In the deployment sequence below, the digifin can be handled.

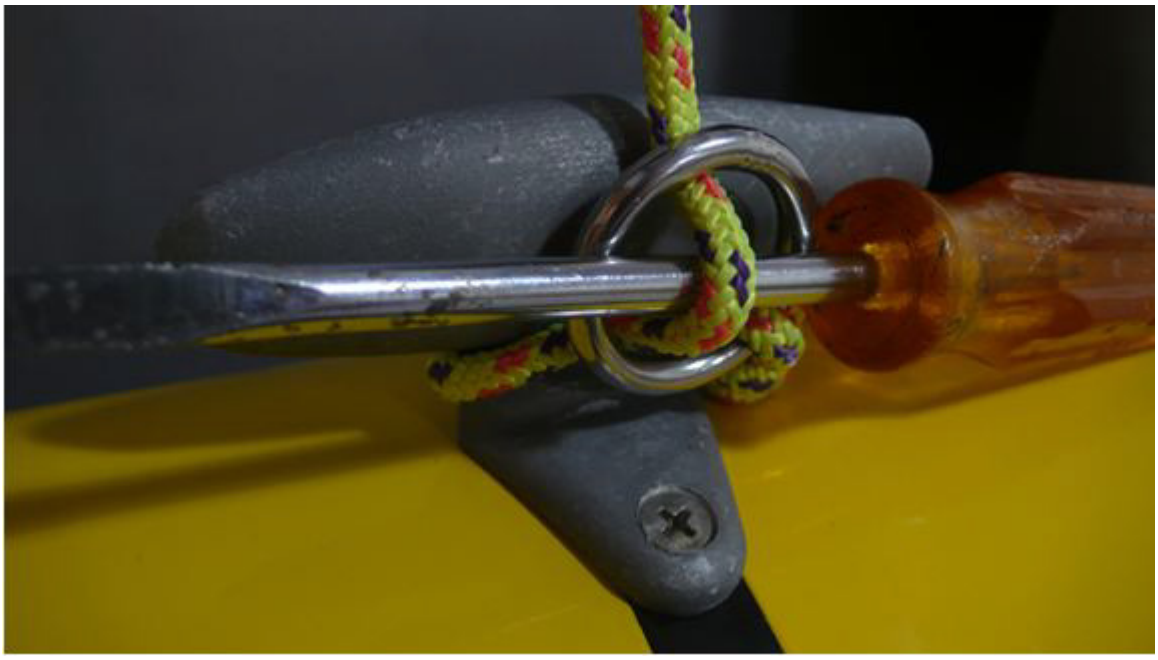
CAUTION Sensors protruding from the vehicle are prone to damage during deployment and recover. Take steps to ensure no damage is done.




WARNING All physical glider activities are two man lift and manipulation. The photos depicting deployment and recovery show a one man demonstration, this should only be attempted in extreme cases

Large Ship Deployment

A quick release system using the pick point can be fashioned from supplies found on most vessels, as illustrated in the following two images.

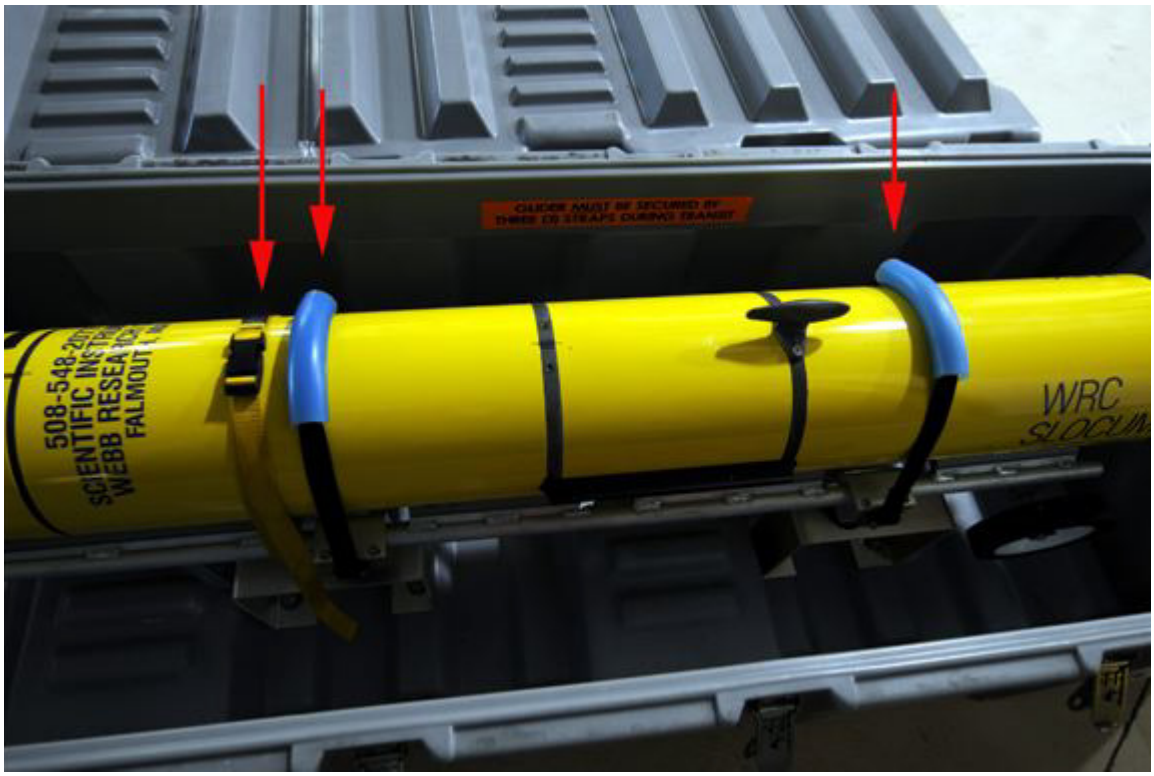


Recovering the Glider

NOTE A boat hook can be used to manipulate the glider in the water.

Lower the cart into water, and manipulate the glider by the digifin into position on the cart. Lift and tilt the glider onto the ship's deck.

Packing the Glider



Ensure that all three straps are secure (two crate straps and one cart strap). If extra supplies are included in the crate, ensure that they will not interfere with the fin or become dislodged during transit.

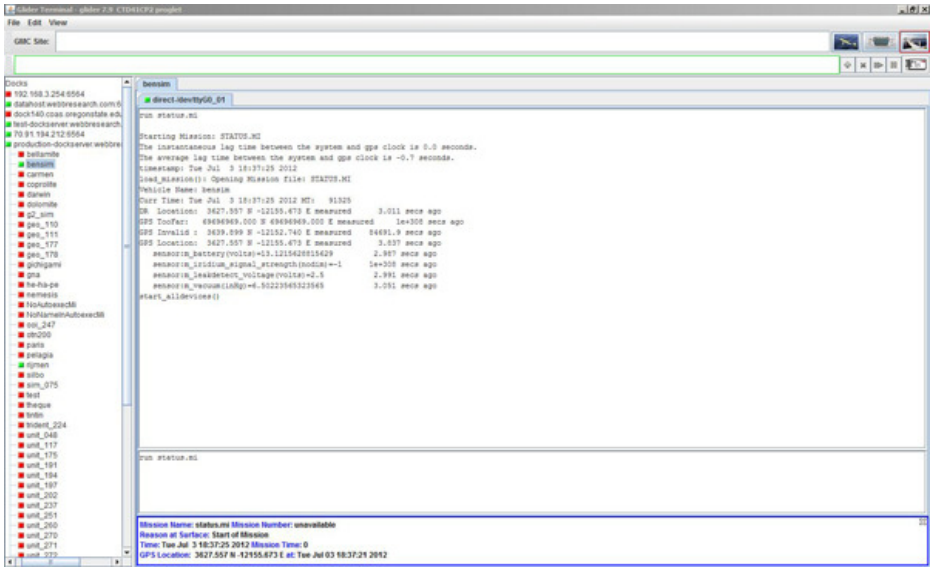
Dockserver

Dockserver is the name of the laptop or rack-mounted Linux CentOS or Redhat based PC provided with a glider. The applications (also named Dockserver and Dataserver) must be launched from desktop icons to provide full Dockserver functionality.

Glider Terminal

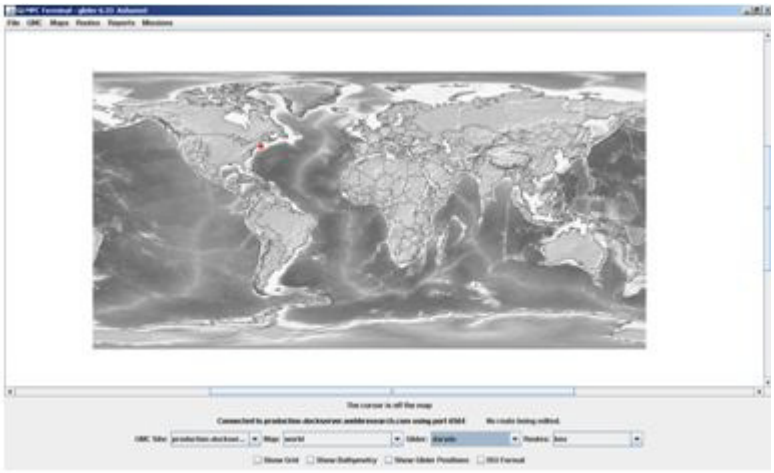
This is the primary interface through the Dockserver to the glider.

- Top panel
  - Dockserver site manual entry
  - Script functionality
  - Terminal and ports perspective toggle and remote glider notification tabs.
- Left panel—Active docks and gliders
- Middle right panel—Communication from the glider
- Bottom right panel—Communication to the glider
- Optional bottom right panel - Mission status



GImpc Terminal

This real-time interface displays custom maps in JPG format and allows click-through uploading of waypoints during live missions.

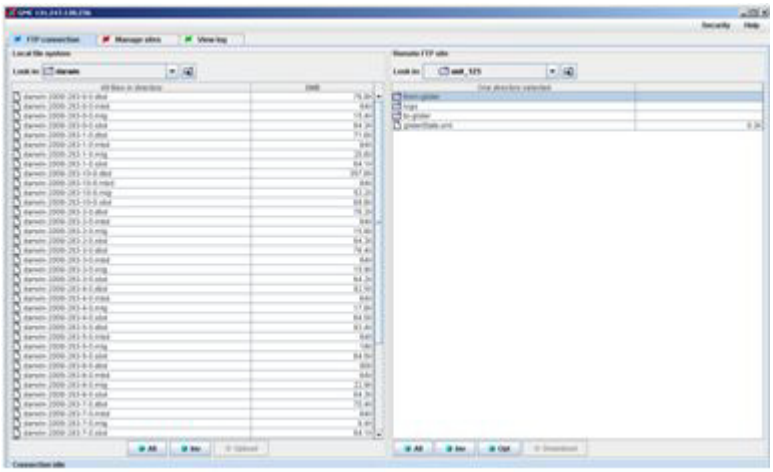


Data Visualizer

The Data Visualizer allows pilots to plot all glider data as it is received by the Dockserver. The Data Visualizer server must be running on Dockserver to view data remotely. Launch the Data Visualizer with the desktop icon on the Dockserver.

Dockserver Java FTP Utility

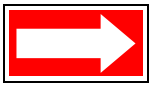
Whenever new files are sent to Dockserver, you must disconnect and reconnect to refresh the file list.



Configure Communications with the Terminal Program (ProComm Plus)

Many users have decided to have a mobile Dockserver and a permanent installation Dockserver. If you do not have a mobile Dockserver, the following settings in the ProComm Plus Terminal program will allow direct communications with a terminal program to the glider.

1. Connect the powered FreeWave to the serial com port on computer with the serial cable provided.
2. Open ProComm Plus.
3. Select the proper com port:
   - Baud 115200
   - Parity N-8-1
4. Go to **Options > System Options > Modem Connection**.
5. Click on **Modem Connection Properties**.
6. If the **Use hardware flow control check box** is unchecked, check it and click **OK**.
7. Click on the **Data** tab.
8. Next to **Receiver Crash Recovery Settings**, click **Change Settings**.
9. Check **If date/time match** under **Crash Recovery Options**.
10. Check **Overwrite if incoming newer** under **Overwrite Options**.
11. Click **OK**.
12. Next to **Sender Crash Recovery Settings**, click **Change Settings**.
13. Check **Crash recovery off** under **Crash Recovery Options**.
14. Check **Always overwrite** under **Overwrite Options**.
15. Click **OK**.
16. Select **Streaming from the Transmit method** menu and uncheck **Use local EOL convention**.
17. Select **32 bit CRC** from the **Error detection** menu, and check **Original file time stamp**.
18. Click **OK**. You are now ready to begin communications with the glider and conduct ZR/ZS testing.



NOTE There are known problems with using HyperTerminal and attempting to ZR/ZS. TeraTerm is another viable terminal program (see http://www.ayera.com/teraterm/).

Surface Dialog

An example of a surface dialog is shown below. Note the available "in mission" glider commands are in bold.

```
Glider bensim at surface.
Because:Hit a waypoint [behavior surface_2 start_when = 8.0]
MissionName:initial.mi MissionNum:bensim-2010-123-2-0
(0103.0000)
Vehicle Name: bensim
Curr Time: Tue May 4 13:25:20 2010 MT:     316
DR Location: 3342.801 N -11824.540 E measured 1.487 secs ago
GPS TooFar: 69696969.000 N 69696969.000 E measured 1e+308 secs
ago
GPS Invalid: 3342.832 N -11824.533 E measured 252.734 secs ago
GPS Location: 3342.801 N -11824.540 E measured 3.994 secs ago
   sensor:m_battery(volts)=13.121562938211 3.926 secs ago
   sensor:m_iridium_signal_strength(nodim)=-1 1e+308 secs ago
   sensor:m_leakdetect_voltage(volts)=2.5 3.921 secs ago
   sensor:m_vacuum(inHg)=6.50223565323565 8.214 secs ago
devices:(t/m/s) errs: 0/ 0/ 0 warn: 0/ 0/ 0 odd: 0/ 0/ 0
ABORT HISTORY: total since reset: 0
```

- Press **Control-R** to resume the mission, i.e. dive!
- Press **Control-C** to end the mission, i.e. GliderDOS.
- Press **Control-E** to extend the surface time by five minutes.
- Press **Control-W** to get device warning reports.
- Press **Control-F** to re-read yo, goto_l, sample, drift_ mafiles.
- Press **S [-f={rf}|{irid] [-num=<n>] [-t=<s>] [filespec ...]** to send log files.
- Press **! <GliderDos cmd>** to execute <GliderDos cmd>.
- Press **Control-T** to consci to science computer when comms ready:

  ...communications *not* ready for consci.
  ... because: sci_m_science_on = 0

```
Water Velocity Calculations COMPLETE
Waypoint: (3342.8323,-11824.5333) Range: 58m, Bearing: 11deg,
Age: -1:-1h:m
Drifting toward outer watch circle, centered on waypoint
Now 58.3 meters from middle, will dive at 100.0 meters
Time until diving is: 150 secs(estimated)
```

File Manipulation

Transferring Files to and from the Glider

Commands for transferring files are named from the perspective of the glider. The send command sends data files from the glider. The zr (receive) command allows the glider to receive files. If FreeWave and Iridium connections are both present, files are sent over FreeWave. A pilot should never use the *.* wildcard when FreeWave communication is not present.

Transferring Files from the Glider

While in GliderDOS, to send only data files from the glider to the Dockserver or a computer running a terminal emulator, the command is send. The send *.* command sends the 30 most recent data files (of type .sbd, .mbd, .dbd, .mlg, .tbd, .nbd, .ebd, .nlg, and sys.log). The send command can also be used to send specific data files or files with specific extensions. For example, send 12345678.ebd will send the file named 12345678.ebd, and send *.nlg will send the 30 most recent .nlg files from the glider.

During a mission, the s command is used in place of the send command. The syntax of these two commands is identical; during a mission, s 12345678.ebd will send the file 12345678.ebd from the glider.

In order to send non-data files from the glider while in GliderDOS the zs command is used instead of the send command, and during a mission the command is pre-pended by an exclamation point (referred to as a “bang”. For example, to send the autoexec.mi file from a glider in GliderDOS, you would type zs \config\autoexec.mi; to send the longterm.sta file from the glider during a mission, you would type !zs \state\longterm.sta.

Transferring Files to the Glider

Sending files to the glider requires the use of either the zr or dockzr command. While the glider is in GliderDOS, pilots operating via a terminal emulator will use the zr command and pilots operating via Dockserver will use the dockzr command. During a mission, an exclamation point (referred to as a “bang”) is prepended to the command. Pilots using the zr command from a terminal emulator are required to include the file path and filename. For example, while in a mission a pilot using a terminal emulator would type !zr <path>\<filename> to send files to the glider. With the glider in GliderDOS, a pilot using Dockserver would type dockzr autoexec.mi to send a new autoexec.mi file to the glider. When using Dockserver, the desired file or files must be in the glider’s directory on the Dockserver. It is not necessary to specify the target file path when using this command because the glider will sort the files into their respective directories automatically.

Glider Do's and Don'ts

Do's

Always do these things with a glider:

- Secure it properly in crate with all three straps for shipping.
- Use fresh desiccants on each deployment.
- Monitor internal vacuum before launch (less vacuum indicates a leak; positive pressure may indicate dangerous gas accumulation).
- Simulate missions before launch.
- Test Iridium and Argos telemetry before launch.

Don'ts

Never do these things with a glider:

- Never power up a shallow glider without a vacuum.
- Never run a simulation on a glider other than "on_bench."
- Never deploy a glider in simulation.
- Never deploy a glider in "boot pico."
- Never exit to pico during a deployment.
- Never power on a glider with more than 15 vDC from an external power supply.
- Never deploy a glider in `lab_mode`.
- Never perform the top of a yo below 30 meters (with 100 or 200 meter glider).
- Never secure the glider to the glider cart while over railing or in the water.

Mission Files (.mi and .ma)

For the default Webb Ashumet missions below, insert text of actual missions and .ma files here if desired. Sensors and arguments commonly changed by users are indicated in blue text.

Stock.mi

```
## stock.mi
#
#  Retrieves waypoints from mafiles/goto_l10.ma
#  Retrieves yo envelope  from mafiles/yo10.ma
#  Retrieves climb to surface controls from mafiles/surfac01 through 06.ma
#  Surfaces:
#     if haven't had comms as controlled by surfac10.ma
#     mission done (finished all the waypoints) surfac11.ma
#     Bad altimeter or half yo's finish surfac.12.ma
#     Every waypoint surfac13.ma
#     If requested by science surfac14.ma
#     Every x minutes Surfac15.mi
# All science sensors sample on only downcast from sample10.ma
#
# 10-July-2010 ballsup@webbresearch.com Initial (based on glmpc.mi)
# 30-Nov-2010  ballsup@webbresearch.comchanged abort for cop tickle 13.5 hours and disabled
percentage method
#
##############################################################################
sensor: c_science_all_on_enabled(bool)   1  # in, non-zero enables c_science_all_on
    # disable this sensor to allow for individually
    # sampled science sensors ie sample11.ma and greater

sensor: u_use_ctd_depth_for_flying(bool) 0  # true=> use ctd measurement for m_depth
                                            # implemented as emergency workaround for
                                            # broken ocean pressure

sensor: u_use_current_correction(nodim)  1  #  0 calculate, but do not use m_water_vx/y
                                            #  1 use m_water_vx/y to navigate AND aim


##############################################################################

behavior: abend
    b_arg: overdepth_sample_time(s)       15.0 # how often to check
                                               # MS_ABORT_OVERTIME
    b_arg: overtime(s)                    -1.0 # < 0 disables
                                               # MS_ABORT_WPT_TOOFAR
```

```
    b_arg: max_wpt_distance(m)          -1   # Maximum allowable distance to a waypoint
    b_arg: samedepth_for_sample_time(s)    30.0 # how often to check
    b_arg: undervolts(volts)               10.0 # < 0 disables Decrease to 9
                                                # for Lithium primary batteries

    b_arg: no_cop_tickle_for(sec)       48600.0 # secs, abort mission if watchdog
                                                # not tickled this often, <0 disables
    b_arg: no_cop_tickle_percent(%)          -1 # 0-100, <0 disables

##############################################################################

# Come up if haven't had comms for a while
behavior: surface
    b_arg: args_from_file(enum) 01 # read from mafiles/surfac01.ma

##############################################################################

    # Come up when mission done
    # This is determined by no one steering in x-y plane (no waypoints)
behavior: surface
    b_arg: args_from_file(enum) 02 # read from mafiles/surfac02.ma

##############################################################################

    # Come up briefly if "yo" finishes
    # This happens if a bad altimeter hit causes a dive and climb to
    # complete in same cycle.  We surface and hopefully yo restarts
    # or change keystroke_wait_time if surfacing for num_half_cycles_to_do
behavior: surface
    b_arg: args_from_file(enum) 03 # read from mafiles/surfac03.ma

##############################################################################

    # Come up every way point
behavior: surface
    b_arg: args_from_file(enum) 04 # read from mafiles/surfac04.ma

##############################################################################

    # Come up when requested by science
behavior: surface
    b_arg: args_from_file(enum) 05 # read from mafiles/surfac05.ma


##############################################################################

    # Come up every x minutes
```

```
behavior: surface
    b_arg: args_from_file(enum) 06 # read from mafiles/surfac06.ma


###############################################################################

behavior: goto_list
    b_arg: args_from_file(enum) 10   # read from mafiles/goto_l10.ma
    b_arg: start_when(enum)      0   # 0-immediately, 1-stack idle 2-heading idle

###############################################################################

behavior: yo
    b_arg: args_from_file(enum) 10   # read from mafiles/yo10.ma
    b_arg: start_when(enum)      2   #  0-immediately, 1-stack idle 2-depth idle
    b_arg: end_action(enum)      2   # 0-quit, 2 resume

###############################################################################

   # Sample all science sensors only on downcast
behavior: sample
b_arg: args_from_file(enum)            10  # >= 0 enables reading from mafiles/sample10.ma

###############################################################################

   # Sample ctd only on downcast
   # sensor c_science_all_on_enabled must be set to 0 to uncouple science sensor union
#behavior: sample
#b_arg: args_from_file(enum)            11  # >= 0 enables reading from mafiles/sample11.ma

###############################################################################

behavior: prepare_to_dive
    b_arg: start_when(enum) 0     # 0-immediately, 1-stack idle 2-depth idle
    b_arg: wait_time(s)   720     # 12 minutes, how long to wait for gps

###############################################################################

behavior: sensors_in       # Turn most input sensors off
```

surfac01.ma

```
behavior_name=surface
# climb to surface with ballast pump full out
# pitch servo'ed to 26 degrees
# Hand Written
# 10 July 2010 ballsup@webbresearch.com based on legacy surfac10.ma

# Come up if haven't had comms for a while, 20 minutes

<start:b_arg>

    b_arg: start_when(enum)         12            # BAW_NOCOMM_SECS 12, when have not had
comms for WHEN_SECS secs

    b_arg: when_secs(sec)           1200          # Surface every 20 minutes for no comms

    b_arg: end_action(enum)         1             # 0-quit, 1 wait for ^C quit/resume, 2
resume, 3 drift til "end_wpt_dist"
    b_arg: gps_wait_time(s)         300           # how long to wait for gps
    b_arg: keystroke_wait_time(sec) 300           # how long to wait for control-C
    b_arg: when_wpt_dist(m)         10            # how close to waypoint before surface,
only if start_when==7
    b_arg: c_use_pitch(enum)        3             # 3:servo
    b_arg: c_pitch_value(X)         0.4528        # 26 deg
    b_arg: printout_cycle_time(sec) 60.0 # How often to print dialog

<end:b_arg>
```

surfac02.ma

```
behavior_name=surface
# climb to surface with ballast pump full out
# pitch servo'ed to 26 degrees
# Hand Written
# 10 July 2010 ballsup@webbresearch.com based on legacy surfac10.ma

#  Come up when mission done
#  This is determined by no one steering in x-y plane (no waypoints)

<start:b_arg>

    b_arg: start_when(enum)         3            # 0-immediately, 1-stack idle 2-pitch idle
3-heading idle
    b_arg: end_action(enum)         0             # 0-quit, 1 wait for ^C quit/resume, 2
resume, 3 drift til "end_wpt_dist"
    b_arg: gps_wait_time(s)         300           # how long to wait for gps
    b_arg: keystroke_wait_time(sec) 180           # how long to wait for control-C
    b_arg: when_wpt_dist(m)         10            # how close to waypoint before surface,
only if start_when==7
    b_arg: c_use_pitch(enum)        3             # 3:servo
    b_arg: c_pitch_value(X)         0.4528        # 26 deg

<end:b_arg>
```

surfac03.ma

```
behavior_name=surface
# climb to surface with ballast pump full out
# pitch servo'ed to 26 degrees
# Hand Written
# 10 July 2010 ballsup@webbresearch.com based on legacy surfac10.ma
# 08 June 2012 ballsup@webbresearch.com increased surface time to "normal"

# Come up briefly if "yo" finishes
# This happens if a bad altimeter hit causes a dive and climb to
# complete in same cycle.  We surface and hopefully yo restarts

# or change keystroke_wait_time if surfacing for num_half_cycles_to_do

<start:b_arg>

    b_arg: start_when(enum)         2             # 0-immediately, 1-stack idle 2-pitch idle
3-heading idle
    b_arg: end_action(enum)         1              # 0-quit, 1 wait for ^C quit/resume, 2
resume, 3 drift til "end_wpt_dist"
    b_arg: gps_wait_time(s)         300            # how long to wait for gps
    b_arg: keystroke_wait_time(sec) 300            # how long to wait for control-C
    b_arg: when_wpt_dist(m)         10             # how close to waypoint before surface,
only if start_when==7
    b_arg: c_use_pitch(enum)        3              # 3:servo
    b_arg: c_pitch_value(X)         0.4528         # 26 deg

<end:b_arg>
```

surfac04.ma

```
behavior_name=surface
# climb to surface with ballast pump full out
# pitch servo'ed to 26 degrees
# Hand Written
# 10 July 2010 ballsup@webbresearch.com based on legacy surfac10.ma

# Come up every way point

<start:b_arg>

    b_arg: start_when(enum)         8              # 8-when hit waypoint
    b_arg: end_action(enum)         1              # 0-quit, 1 wait for ^C quit/resume, 2
resume, 3 drift til "end_wpt_dist"
    b_arg: gps_wait_time(s)         300            # how long to wait for gps
    b_arg: keystroke_wait_time(sec) 300            # how long to wait for control-C
    b_arg: when_wpt_dist(m)         10             # how close to waypoint before surface,
only if start_when==7
    b_arg: c_use_pitch(enum)        3              # 3:servo
    b_arg: c_pitch_value(X)         0.4528         # 26 deg
    b_arg: printout_cycle_time(sec) 60.0 # How often to print dialog

<end:b_arg>
```

surfac05.ma

```
behavior_name=surface
# climb to surface with ballast pump full out
# pitch servo'ed to 26 degrees
# Hand Written
# 10 July 2010 ballsup@webbresearch.com based on legacy surfac10.ma

# Come up when requested by science

<start:b_arg>

    b_arg: start_when(enum)         11   # BAW_SCI_SURFACE
    b_arg: end_action(enum)         1             # 0-quit, 1 wait for ^C quit/resume, 2
resume, 3 drift til "end_wpt_dist"
    b_arg: gps_wait_time(s)         300           # how long to wait for gps
    b_arg: keystroke_wait_time(sec) 300           # how long to wait for control-C
    b_arg: when_wpt_dist(m)         10            # how close to waypoint before surface,
only if start_when==7
    b_arg: c_use_pitch(enum)        3             # 3:servo
    b_arg: c_pitch_value(X)         0.4528        # 26 deg

<end:b_arg>
```

surfac06.ma

```
behavior_name=surface
# climb to surface with ballast pump full out
# pitch servo'ed to 26 degrees
# Hand Written
# 10 July 2010 ballsup@webbresearch.com based on legacy surfac10.ma

# Come up every three hours

<start:b_arg>

    b_arg: start_when(enum)         9   # 9-every when_secs
    b_arg: end_action(enum)         1             # 0-quit, 1 wait for ^C quit/resume, 2
resume, 3 drift til "end_wpt_dist"

    b_arg: when_secs(s)             10800           # How long between surfacing, only if
start_when==6 or 9


    b_arg: gps_wait_time(s)         300           # how long to wait for gps
    b_arg: keystroke_wait_time(sec) 300           # how long to wait for control-C
    b_arg: when_wpt_dist(m)         10            # how close to waypoint before surface,
only if start_when==7
    b_arg: c_use_pitch(enum)        3             # 3:servo
    b_arg: c_pitch_value(X)         0.4528        # 26 deg
    b_arg: printout_cycle_time(sec) 60.0 # How often to print dialog

<end:b_arg>
```

goto10.ma

goto10.ma

```
behavior_name=goto_list
#  Written by gen-goto-list-ma ver 1.0 on GMT:Tue Feb 19 18:56:54 2002
#  07-Aug-02 tc@DinkumSoftware.com Manually edited for spawars 7aug02 op in buzzards bay
#  07-Aug-02 tc@DinkumSoftware.com Changed from decimal degrees to degrees, minutes, decimal
minutes
#  ??-Apr-03 kniewiad@webbresearch.com changed to ashument
#  17-Apr-03 tc@DinkumSoftware.com fixed comments
# goto_l10.ma
# Flies the box in ashumet
# Each leg about 200m<start:b_arg>

b_arg: num_legs_to_run(nodim) -1 # loop
b_arg: start_when(enum) 0 # BAW_IMMEDIATELY
b_arg: list_stop_when(enum) 7 # BAW_WHEN_WPT_DIST
b_arg: initial_wpt(enum) -2 # closest
b_arg: num_waypoints(nodim) 4
<end:b_arg>
<start:waypoints>
-7032.0640   4138.1060
-7031.9200   4138.1090
-7031.9170   4138.0000
-7032.0610   4137.9980
<end:waypoints>
```

yo10ma

yo10ma.

```
behavior_name=yo
# yo10.ma
# climb 3m   dive 12m alt 9m pitch 26 deg
# Hand Written
# 18-Feb-02 tc@DinkumSoftware.com Initial
# 13-Mar-02 tc@DinkumSoftware.com Bug fix, end_action from quit(0) to resume(2)
# 09-Apr-03 kniewiad@webbresearch.com Adjusted for Ashumet
<start:b_arg>
    b_arg: start_when(enum)      2   # pitch idle (see doco below)
    b_arg: num_half_cycles_to_do(nodim) -1   # Number of dive/climbs to perform
                                     # <0 is infinite, i.e. never finishes
    # arguments for dive_to
    b_arg: d_target_depth(m)     12
    b_arg: d_target_altitude(m)   3
    b_arg: d_use_pitch(enum)      3   # 1:battpos  2:setonce  3:servo
                                      #   in         rad        rad, <0 dive
    b_arg: d_pitch_value(X)   -0.4528     # -26 deg
```

```
    # arguments for climb_to
    b_arg: c_target_depth(m)      3
    b_arg: c_target_altitude(m)  -1
    b_arg: c_use_pitch(enum)      3   # 1:battpos  2:setonce  3:servo
                                      #   in         rad        rad, >0 climb
    b_arg: c_pitch_value(X)     0.4538     # 26 deg
    b_arg: end_action(enum) 2     # 0-quit, 2 resume
<end:b_arg>


# NOTE: These are symbolically defined beh_args.h
# b_arg: START_WHEN     When the behavior should start, i.e. go from UNITIALIZED to ACTIVE
#    BAW_IMMEDIATELY    0   // immediately
#    BAW_STK_IDLE       1   // When stack is idle (nothing is being commanded)
#    BAW_PITCH_IDLE     2   // When pitch is idle(nothing is being commanded)
#    BAW_HEADING_IDLE   3   // When heading is idle(nothing is being commanded)
#    BAW_UPDWN_IDLE     4   // When bpump/threng is idle(nothing is being commanded)
#    BAW_NEVER          5   // Never stop
#    BAW_WHEN_SECS      6   // After behavior arg "when_secs", from prior END if cycling
#    BAW_WHEN_WPT_DIST  7   // When sensor(m_dist_to_wpt) < behavior arg "when_wpt_dist"
#    BAW_WHEN_HIT_WAYPOINT 8 // When X_HIT_A_WAYPOINT is set by goto_wpt behavior
#    BAW_EVERY_SECS     9   // After behavior arg "when_secs", from prior START if cycling
#    BAW_EVERY_SECS_UPDWN_IDLE 10  // After behavior arg "when_secs", from prior START AND
#                                  //      updown is idle, no one commanding vertical motion
#    BAW_SCI_SURFACE    11  // SCI_WANTS_SURFACE is non-zero
#    BAW_NOCOMM_SECS    12  // when have not had comms for WHEN_SECS secs
# b_arg: STOP_WHEN
#   0   complete
#   1-N same as "start_when"
```

sample10.ma

```
behavior_name=sample
# sample all science sensors on down cast only
# 10-July-2010 ballsup@webbresearch.com handwritten for stock.mi

<start:b_arg>
   b_arg: sensor_type(enum)                0 # ALL    0  C_SCIENCE_ALL_ON
                                               # PROFILE     1  C_PROFILE_ON
                                               # HS2    2  C_HS2_ON
                                               # BB2F    3  C_BB2F_ON
                                               # BB2C    4  C_BB2C_ON
                                               # BB2LSS      5  C_BB2LSS_ON
                                               # SAM    6  C_SAM_ON
                                               # WHPAR       7  C_WHPAR_ON
                                               # WHGPBM      8  C_WHGPBM_ON
                                               # MOTEBB      9  C_MOTEBB_ON
                                               # BBFL2S     10  C_BBFL2S_ON
                                               # FL3SLO     11  C_FL3SLO_ON
                                               # BB3SLO     12  C_BB3SLO_ON
                                               # OXY3835    13  C_OXY3835_ON
                                               # WHFCTD     14  C_WHFCTD_ON
                                               # BAM        15  C_BAM_ON
                                               # OCR504R    16  C_OCR504R_ON
                                               # OCR504I    17  C_OCR504I_ON
                                               # BADD       18  C_BADD_ON
                                               # FLNTU      19  C_FLNTU_ON
                                               # FL3SLOV2   20  C_FL3SLOV2_ON
                                               # BB3SLOV2   21  C_BB3SLOV2_ON
                                               # OCR507R    22  C_OCR507R_ON
                                               # OCR507I    23  C_OCR507I_ON
                                               # BB3SLOV3   24  C_BB3SLOV3_ON
                                               # BB2FLS     25  C_BB2FLS_ON
                                               # BB2FLSV2   26  C_BB2FLSV2_ON
                                               # OXY3835_WPHASE 27 C_OXY3835_WPHASE_ON
                                               # AUVB       28  C_AUVB_ON
                                               # BB2FV2     29  C_BB2FV2_ON
                                               # TARR       30  C_TARR_ON
                                               # BBFL2SV2   31  C_BBFL2SV2_ON
                                               # GLBPS      32  C_GLBPS_ON
                                               # SSCSD      33  C_SSCSD_ON
                                               # BB2FLSV3   34  C_BB2FLSV3_ON
                                               # FIRE       35  C_FIRE_ON
                                               # OHF        36  C_OHF_ON
                                               # BB2FLSV4   37  C_BB2FLSV4_ON
                                               # BB2FLSV5   38  C_BB2FLSV5_ON
                                               # LOGGER     39  C_LOGGER_ON
                                               # BBAM       40  C_BBAM_ON
                                               # UMODEM     41  C_UMODEM_ON
                                               # RINKOII    42  C_RINKOII_ON
                                               # DVL        43  C_DVL_ON
                                               # BB2FLSV6   44  C_BB2FLSV6_ON
```

```
                                        # This is a bit-field, combine:
                                    # 8 on_surface, 4 climbing, 2 hovering, 1 diving
    b_arg: state_to_sample(enum)         1  # 0  none
                                            # 1  diving
                                            # 2  hovering
                                            # 3  diving|hovering
                                            # 4  climbing
                                            # 5  diving|climbing
                                            # 6  hovering|climbing
                                            # 7  diving|hovering|climbing
                                            # 8  on_surface
                                            # 9  diving|on_surface
                                            # 10 hovering|on_surface
                                            # 11 diving|hovering|on_surface
                                            # 12 climbing|on_surface
                                            # 13 diving|climbing|on_surface
                                            # 14 hovering|climbing|on_surface
                                            # 15 diving|hovering|climbing|on_surface

    b_arg: intersample_time(s)           0  # if < 0 then off, if = 0 then
                                            # as fast as possible, and if
                                            # > 0 then that many seconds
                                            # between measurements

    b_arg: nth_yo_to_sample(nodim)       1  # After the first yo, sample only
                                            # on every nth yo. If argument is
                                            # negative then exclude first yo.

    b_arg: intersample_depth(m)         -1  # supersedes intersample_time
                                            # by dynamically estimating
                                            # and setting intersample_time
                                            # to sample at the specified
                                            # depth interval. If <=0 then
                                            # then sample uses
                                            # intersample_time, if > 0 then
                                            # that many meters between
                                            # measurements

    b_arg: min_depth(m)                 -5  # minimum depth to collect data, default
                                            # is negative to leave on at surface in
                                            # spite of noise in depth reading
    b_arg: max_depth(m)               2000  # maximum depth to collect data

<end:b_ar
```

Appendix A: Glider Commands

To list all commands that are available, type `help` from a GliderDOS prompt. These commands are also listed in the table below. For examples of how commands are used, see the "Sample Mission and Comments" section in Appendix A of the *Slocum G2 Glider Operators Manual*.

Command Name	Syntax and/or Description
attrib	ATTRIB [+ - RASH] [d:][p][name]
ballast	BALLAST ?; for help
boot	boot [PICO][PBM][APP]
callback	callback <minutes til callback>
capture	capture [d:][p]fn [/Dx/B/N/E]
cd	Change directory
chkdsk	CHKDSK [d:][p][fn] [/F][/I] *
clrdeverrs	Zero device errors
consci	consci [-f rf|irid]; console to science
copy	copy source dest [/V]
cp	CP <src_path> <dest_path>; copies a file system branch
crc	Computes CRC on memory
date	DATE [mdy[hms[a|p]]] /IEUMCP]
dellog	DELLOG ALL MLG DBD SBD
del	DEL [drv:][pth][name] [/P]
devices?	Prints device driver information
df	Prints disk space used and disk space free
dir	DIR [d:][p][fn] [/PWBLV4A:a]
dump	DUMP file[start[,end]] *
erase	ERASE [drv:][pth][name] [/P] *

Command Name	Syntax and/or Description
exit	exit [-nofin] [poweroff|reset|pico|pbm]
get	GET <sensor name>
hardware?	HARDWARE? [-v]; hardware configuration
heap	Reports free memory
help	Prints help for commands
highdensity	HIGHDENSITY ?; for help
lab_mode	LAB_MODE [on|off]
list	Displays all sensor names
loadmission	Loads mission file
logging	logging on|off; during GliderDOS
longterm_put	LONGTERM_PUT <sensor name> <new value>
longterm	LONGTERM ?; for help
ls	LS [path] ; list a file system branch
mbd	MBD ?; for help
mkdir	MKDIR [drive:][path]
mv	MV <src_path> <dest_path>; copy a file system branch
path	PATH Show search path * PATH [[d:]path[;...]] [/P] *
prompt	prompt [text] [/P] *
prunedisk	Prunes expendable files to free space on disk
purgelogs	Deletes sent log files
put	PUT <sensor name> <value>
rename	RENAME [d:][p]oldname newname
report	REPORT ?; for help
rmdir	RMDIR [drive:][path]
rm	RM <path>; deletes a file system branch *
run	run [mission_file]; runs the mission file
sbd	SBD ?; ? for help

Command Name	Syntax and/or Description
send	SEND [-f={rf}|{irid] [-num=<n>] [-t=<s>] [filespec ...]
sequence	SEQUENCE ?; do this for help
setdevlimit	SETDEVLIMIT devicename os w/s w/m
setnumwarn	SETNUMWARN [X]; sets max dev warnings to X
set	SET [var=[str]] [/SLFE?] *
simul?	Displays a print description of what is simulated
srf_display	SRF_DISPLAY ?; for help
sync_time	sync_time [offset]; syncs system time with gps time
tcm3	TCM3 ?; for help
time	TIME [hh:mm:ss [a|p]] [/M/C]
tvalve	tvalve [up|charge|down][backward] *
type	TYPE [drv:][pth][name]
use	USE ?; do this for help
ver	Displays firmware versions
where	Prints latitude/longitude
whoru	whoru Vehicle Name:; displays vehicle name
why?	WHY? [abort#]; displays the reason for an abort
wiggle	wiggle [on|off] [fraction]; moves motor
zero_ocean_pressure	Recalibrates zero ocean pressure
zr	Zmodem Rec: zr ? for help
zs	Zmodem Send: zs ? for help

** not often used by average use*

Appendix B: Worksheets

This appendix contains the worksheets you will use frequently in glider operations.

Glider Operations Mission Planning Overview Worksheet

Glider number		**Prepared by**	
Payload instruments			
Deployment location	**Surf temp**	**Surf sal**	**Density**
Deployment date			
Deployment notes			
Science collection notes			
	Date	**Tech**	**Notes**
Ballast completed			
Software checklist completed			
Missions simulated			
Dockserver tested and updated			
Dockserver IP			
Pre-seal checklist completed			
Post-seal checklist completed			
All supplies packed			
Deployment details			
Cruise leaves			
Arrive on station			
Recovery details			
Cruise leaves			
Emergency recovery plans			

Pilot's contact information	When	Phone	Email

Mission notes

Pre-mission Seal Checklist (Final Seal)

All ballasting complete and weights adjusted; see the “Ballasting and H-moment” worksheet on page 44.

	Date	Tech	Notes
Fore			
Pump lead screw clean and greased			
Pitch lead screw clean and greased			
Leak detect in place; batteries secured			
Ballast bottles secured			
O-ring inspected and lubed			
Exterior nose/bellow clean of debris			
Interior clean of debris			
Reconstituted or fresh dessiccant installed			
Payload			
Science serial numbers			
1			4
2			5
3			6
Wiring dressed			
O-ring inspected and lubed			
Payload weights properly secured			
CF card fully seated and loaded			See software checklist (lab section)
Persistor button batteries checked			voltage
Interior clean of debris			
Aft			
Iridium SIM card installed			
SIM number			
Aft tray wiring dressed			
CF card seated and loaded			See software checklist (lab section)
Persistor button batteries checked			voltage
Ballast bottle secured			
O-ring inspected and lubed			
Alkaline Battery voltages			
Fore			voltage
Pitch			voltage
Battery voltage (emergency)			
Anode to main tray continuity			
Threaded rod clean and greased			
Seal			
O-rings clean of debris			
15 in/lb torque			
All sections snug together			
Vacuum pulled			

Post-seal Checklist

	Date	Tech	Notes
General			
Functional test procedure complete			
Pick point installed			
Wing rails installed			
Wings and spareds packed			
Hardware			
Exterior connectors secure and fastened			
Altimeter			
Aanderaa (if present)			
Burn wire			
MS plug seated			
Ejection weight assembly not seized			
Pressure sensors clear and clean			
Aft (flight)			
Payload (science)			
Bladder visual inspection			
Cowling installed			
Powered by battery **inside lab**			
`Lab_mode_on`			in/hg
`Report ++m_vacuum` (6 in/Hg 7 for 1000 m)			volt
`Lab_mode_on  Wiggle on`			no errors for +5 minute
Verify time			
Verify science			
`Put c_science_all_on 0 (off = -1)`			
`Put c_science_on 3 (off = 1)`			
`Put c_science_send_all 1 (off = 0)`			
Powered by battery **outside lab tests**			
3 hrs Argos `put c_argos_on 3 (off = 1)`			
Confirm receipt of messages at Argos			
Confirm GPS			
Confirm compass			
Dockserver communications—send and receive files			
Run status.mi			
Notes:			

Shipping Checklist

	Date	Tech	Notes
Glider packed and secured with 3 straps			
Mobile computer packed			
FreeWave and FreeWave antenna			
Buoy with rope			
Glider evacuation tools			
Glider tools			
Red and green shorting plugs			
Wings packed and SS wing rail mass			
Shipping address and details arranged			
Address	**Contacts**		**Details**
Flights	**Contacts**		**Details**

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