

RBRcervello

ANTARCTIC

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1 Introduction

The RBR*cervello* is a general-purpose controller designed for use in surface expressions of various kinds. Typically connected to one or more RBR instruments using an inductive modem, it is responsible for archiving logged data locally onto an SD card, as well as optionally uploading that data to the RBR data hosting service via Iridium Satellite or GSM cellular modems.

2 Hardware

2.1 Opening and closing the RBRcervello

Opening the controller

1. Position the RBRcervello upright.
2. Locate and grab the locking tabs on the cap.
3. Pull the tabs to their sides.
4. Pull the internal assembly from the external handle.



Closing the controller

1. Position the RBRcervello housing upright.
2. Insert the internal assembly into the housing.
3. Align the locking tabs with the openings on the top of the housing.
4. Press firmly.
5. Lock the tabs back in place.



2.2 RBRcervello Antarctica crate

The RBRcervello Antarctica crate contains all the elements needed to deploy the RBRcervello controller in dry environments with a mooring line feed. It features cable feed-throughs for a mooring line, an external GPS antenna, and an external Iridium antenna, as well as staples, screws, screwdriver, hex keys, zip ties, castors, and clamps.



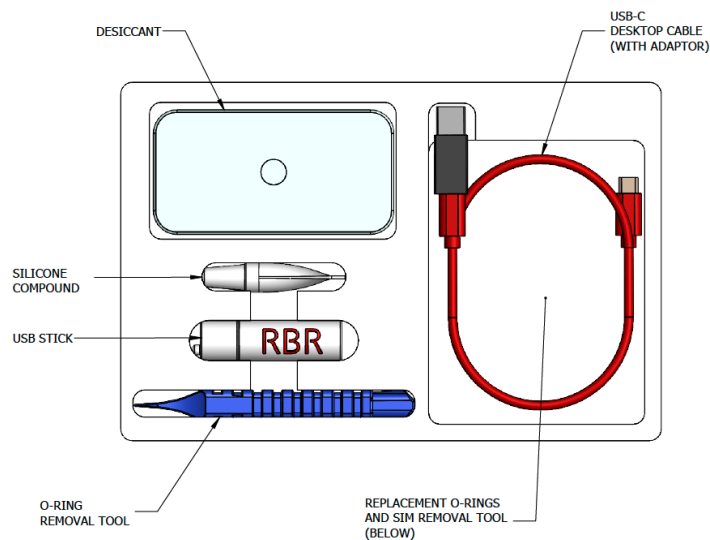
RBRcervello Antarctica crate, open

3 General maintenance

3.1 Support kit

RBR provides one support kit and one cable kit for every RBRcervello ordered.

The RBRcervello support kit contains an assortment of basic accessories and spare parts, as presented below. If you need more units, contact [RBR](#).



RBRcervello support kit diagram

The RBR cervello cable kit contains the MLM inductive loop cable and MLM inductive test loop termination cable. If you need more units, contact [RBR](#).



MLM test loop cable



Termination cable

3.2 Replacing batteries

RBR may ship new RBRcervello data controllers with or without lithium thionyl chloride batteries included, depending on your work order.

When ordered without the batteries, open your RBRcervello and insert the batteries as shown below. Before each deployment, replace the batteries to maximise the operational time and prevent data loss.

To remove the battery pack:

1. Remove the internal assembly from the RBRcervello.
See [Opening the controller](#).
2. Remove the intermediate foam.
3. Press the switch to the "off" position.
4. Twist the lock counterclockwise.
5. Pull the internal battery pack out and remove it from the internal assembly.



Battery connector

To install a new battery pack:

1. Insert the new battery pack into the RBRcervello internal assembly.
2. Insert the intermediate foam on top of the battery pack.
3. Push the battery pack down, into the connector, and twist the lock clockwise.
4. Press the switch to the "on" position.
5. Insert the internal assembly back in the RBRcervello housing. See [Closing the controller](#).



Lock connector



Inserted battery and foam

3.3 Replacing desiccant

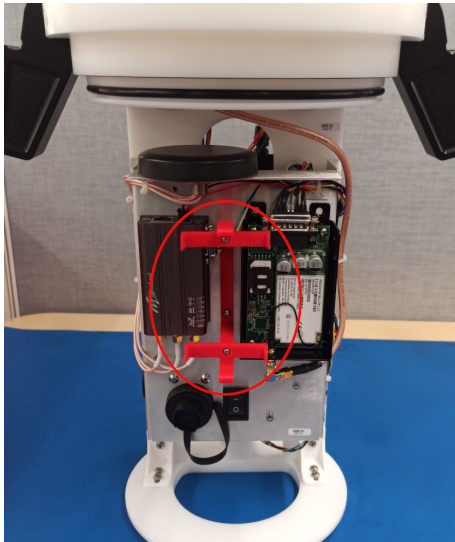
Replace desiccant before each deployment. One spare desiccant canister is included in the [support kit](#).

Fresh desiccant will keep the RBRcervello compartment dry and prevent malfunction. Water damage may occur if condensation forms inside the controller.

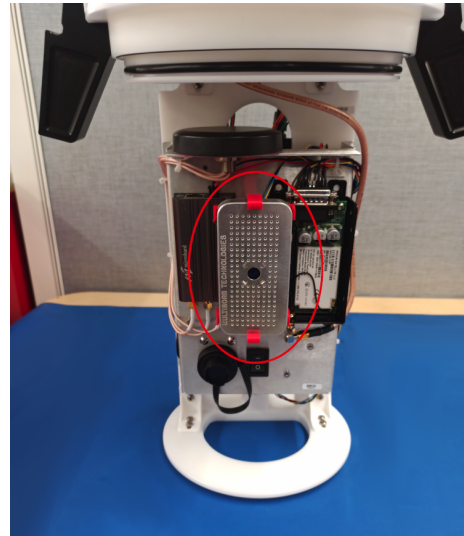
As a preventative measure, RBR recommends servicing the instrument in a cool, dry place (when possible).

Replacing the desiccant canister

1. Remove the battery end-cap and pull out the internal assembly. See [Opening the controller](#).
2. Unclip the desiccant canister from the holder.
3. Insert the new desiccant canister into the holder.
4. Insert the internal assembly into the RBRcervello housing. See [Closing the controller](#).



Desiccant canister holder



Desiccant canister fully inserted

3.4 Cables and connectors

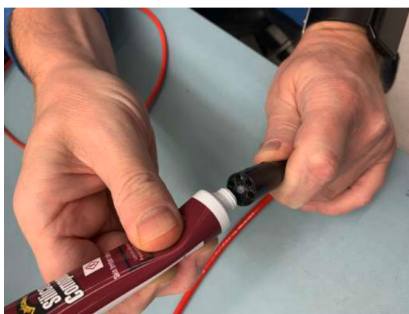
Cable bend radius

The smallest bend radius for RBR supplied cables is 15cm.

Lubricating the connectors

Lubrication improves watertight sealing, prevents corrosion, and reduces the force required to de-mate the connector. Use the silicone compound provided with your instrument.

- Apply the silicone compound to all female connectors before every mating
- Ensure each connector hole is filled with approximately 30% lubricant



Lubricating a connector

Reducing mechanical stress

- Do not pull on the cable
- Hold onto the connector to pull out the cable
- Disconnect by pulling straight out, not at an angle
- Avoid sharp bends at the point where the cable enters the connector
- Avoid angular loads on the connector

4 Getting started

4.1 Using the diagnostic port

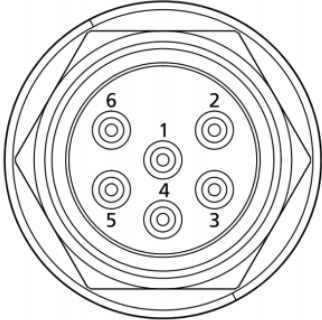


- USB to MCIL-6-FS cable (provided)
- Computer with a USB port
- [Serial terminal](#)

Cable connection

The RBRcervello diagnostic port consists of a 6-pin bulkhead connector with power and RS-232 connections. It is meant to be used in conjunction with an RBR patch cable with RS-232 electrical connections, like the one provided in the RBRcervello [shipping crate](#).

External MCBH-6-MP diagnostic connector pinout

	Pin No.	RS-232
	1	Ground
	2	Power +9 to +22 V
	3	Data output from the instrument (Tx)
	4	Data input into the instrument (Rx)
	5	N/C
	6	N/C

Serial terminal



- 115200baud
- 8bit, no parity-bit, 1 stop-bit: 8N1
- No flow control

Use a terminal emulator to communicate with the RBRcervello through its diagnostic port.

Windows

On a Windows-based workstation, use any terminal emulator console that supports a serial port, such as Tera Term.

Tera Term

Tera Term is an open-source terminal emulator that lets you connect to hosts via serial port or the network. The default settings should work with the RBRcervello interface. In the unlikely event when they do not, load the configuration file provided below using the "Setup→Restore setup" menu.

[Teraterm_RBRcervello.INI](#)

```

COM12 - Tera Term VT
File Edit Setup Control Window Help
RBRcervello Menu.
These are the available commands to manage RBRcervello

disable          Disable deployment.
status           Provide a general overview or detailed information on
                 controller and instruments.
diagnose          Diagnostics for MLM and telemetry.
config-check      Print the current configuration of a specific RBR
                 subsystem.
edit-config       Edit the current configuration of a specific
                 RBR subsystem.
set-instrument-clock RBR instrument clock sync.
set-cervello-clock RBRcervello clock setter.
cervello-clock    RBRcervello clock checker.
scrub-controller  Clear all data stored in the SD card.
scrub-instrument  RBR instrument scrubber.
enable            Enable deployment according to internal configuration
                 files.
reboot-controller Reboot system as if it had entered deep-sleep and
                 waken up.
help             Show this menu.

RBRcervello> █

```

Tera Term

Alternatively, configure the settings manually as follows:

- In "Setup→Terminal setup" menu, enter the terminal size:

- In "Setup→Keyboard setup" menu, select "Delete key":

- In "Setup→Serial port setup and connection" menu, select the correct COM port:

Tera Term: Serial port setup and connection

Port:	COM12	New setting Cancel Help
Speed:	115200	
Data:	8 bit	
Parity:	none	
Stop bits:	1 bit	
Flow control:	none	
Transmit delay 0 msec/char 0 msec/line		



Highlighting text on the terminal automatically copies it to the clipboard. Right-clicking on the terminal will paste the saved text on it.

Linux

On a Linux-based workstation, use any terminal emulator console that supports a serial port, such as Minicom.

Minicom

Minicom is a serial communication program that connects to devices through a GNU/Linux serial ports. Use the "-s" command to set up the terminal with the right port and settings, or execute it with explicit settings at runtime with the correct device:

```
1 minicom -b 115200 -D /dev/ttyUSB0
```

```
RBRcervello Menu.
These are the available commands to manage RBRcervello

disable      Disable deployment.
status       Provide a general overview or detailed information on
             controller and instruments.
diagnose     Diagnostics for MLM and telemetry.
config-check Print the current configuration of a specific RBR
             subsystem.
edit-config  Edit the current configuration of a specific
             RBR subsystem.
set-instrument-clock RBR instrument clock sync.
set-cervello-clock  RBRcervello clock setter.
cervello-clock  RBRcervello clock checker.
scrub-controller Clear all data stored in the SD card.
scrub-instrument RBR instrument scrubber.
enable        Enable deployment according to internal configuration
             files.
reboot-controller Reboot system as if it had entered deep-sleep and
             waken up.
help          Show this menu.

RBRcervello>
```

Minicom

```
+-----+
| A - Serial Device      : /dev/ttyUSB0 |
| B - Lockfile Location  : /var/lock    |
| C - Callin Program     :              |
| D - Callout Program    :              |
| E - Bps/Par/Bits       : 115200 8N1  |
| F - Hardware Flow Control : No        |
| G - Software Flow Control : No        |
+-----+
Change which setting?
+-----+
| Screen and keyboard |
| Save setup as dfl    |
| Save setup as..     |
| Exit                |
| Exit from Minicom   |
+-----+
```

Minicom serial settings



To copy and paste text from and to a Linux terminal, use Ctrl+Shift+C and Ctrl+Shift+V.

Diagnostic menu overview

Access the RBR*cervello* menu via the diagnostic port using an RS-232 interface (115200 8N1). It is a fully-featured Bash terminal (Restricted Bash) with "tab" completion. To see the list of available commands, execute the "help" command. You will find all you need to deploy the RBR*cervello* with the RBR instruments. As a quick in-menu reference, each command displays a short manual when executed with the "-h" or "--help" argument.

```
RBRcervello> status-check -h
RBR status-check ver. 1.0

Provide an overview on the system status.

Prints a status overview of the controller including battery
information, storage usage, connected instruments status.

Usage: status-check [-h|--help] | [-v|--version]
       status-check [-p|--progress]

Options:
-h, --help          Display this help message and exit.
-v, --version       Output version information and exit.
-p, --progress      Show progress bars for downloads.

RBRcervello>
```

"Status" help

```
1 RBRcervello Menu.  These are the available commands to manage RBRcervello
2   disable          Disable deployment.
3   status           Provide a general overview or detailed information on
4                     controller and instruments.
5   diagnose         Diagnostics for MLM and telemetry.
6   config-check      Print the current configuration of a specific RBR subsystem.
7   edit-config       Edit the current configuration of a specific RBR subsystem.
8   set-instrument-clock RBR instrument clock sync.
9   set-cervello-clock RBRcervello clock setter.
10  cervello-clock    RBRcervello clock checker.
11  scrub-controller  Clear all data stored in the SD card.
12  scrub-instrument  RBR instrument scrubber.
13  enable            Enable deployment according to internal configuration files.
14  reboot-controller Reboot system as if it had entered deep-sleep and waken up.
15  help             Show this menu.
16 RBRcervello>
```

See the [Diagnostic menu](#) section for more information.

4.2 Telemetry

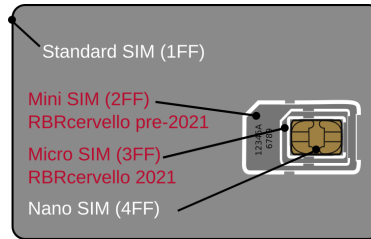
All new RBR *cervello* Antarctica data controllers are equipped with a dual-mode GSM/RUDICS modem. Some legacy data controllers may only have the GSM-only modem integrated. See below for details on setting up your telemetry options, depending on your modem type.

GSM

Before GSM telemetry can function, a SIM-card equipped with a data plan must be installed into the RBR*cervello*.



The end-user is responsible for provisioning a SIM-card and a data plan for use with the RBR*cervello*. To determine specific data quota requirements for your deployment scenario, please contact [RBR](#).



SIM-card comparison ([Wikipedia](#))



Legacy GSM modem, isolated, with the SIM-card slot highlighted



GSM modem, dual-mode, pre-April 2021



GSM modem, dual-mode, post-April 2021

Supported bands

Legacy GSM-only	UMTS/HSPA FDD Bands (Bands 1,2,4,5,6,8)
Dual-mode GSM pre-2021	LTE FDD (Bands 2,4,5,12,13,14,66,71) WCDMA (Bands 2,4,5)
Dual-mode GSM 2021	LTE FDD (Bands 1,2,3,4,5,7,8,12,13,18,19,20,26,28) LTE TDD (Bands 38,39,40,41) WCDMA (Bands 1,2,4,5,6,8,19) GSM (Bands 2,3,5,8)

Accessing the GSM modem

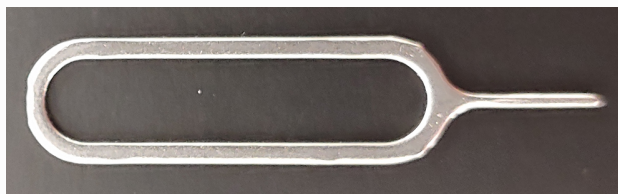
For legacy, GSM-only data controllers (to open the main RBRcervello enclosure):

- 2.5mm hex key
- Philips #2 screwdriver

For dual-modems manufactured after April 2021:



- SIM removal tool (included in the [support kit](#))



A GSM modem is integrated into the RBRcervello. Its location varies based on whether you have a legacy, GSM-only RBRcervello data controller variant or a dual-mode GSM/RUDICS data controller.

Legacy, GSM-only

1. Pull the handle straight up and remove the internal assembly from the housing.

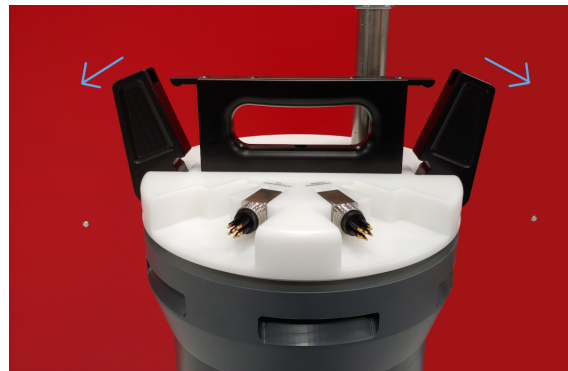
Mounted in the middle section of the internal frame are two black enclosures. The smaller of these is the head-end modem (HEM) of the mooring line modem (MLM) inductive modem system. The larger contains the RBRcervello processor and the GSM modem.

2. Disconnect the cables from the top and bottom of each enclosure.
3. Remove the four 2.5mm hex screws holding the HEM in place.
4. Remove the HEM.
5. Remove the four Philips #2 screws from the lid of the main RBRcervello enclosure.
6. Remove the lid.

The GSM modem is the topmost component in the main enclosure.

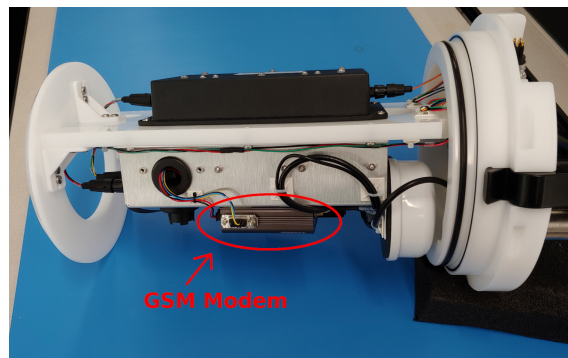
Dual-mode GSM/RUDICS

1. Flip the two tabs on the top handle outwards
2. Pull the handle straight up to remove the internal assembly.



3. Rest the internal assembly on the lip of the housing.
4. Disconnect the battery connector.
5. Remove the internal assembly fully and rest it on a flat work surface.
6. Orient the internal assembly with the HEM facing upwards.

The GSM modem will be directly above the LEDs.



RBRcervello, dual-mode, pre-April 2021

The GSM modem accepts a mini SIM-card (2FF). Once you have located the modem, insert the mini SIM-card into the SIM-card slot, oriented as indicated by the label on the modem.

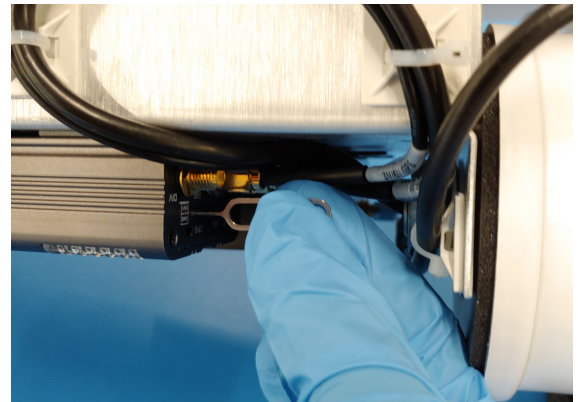
RBRcervello, dual-mode, manufactured after April 2021

The GSM modem accepts a micro SIM-card (3FF).

1. Locate the pinhole in the SIM tray.



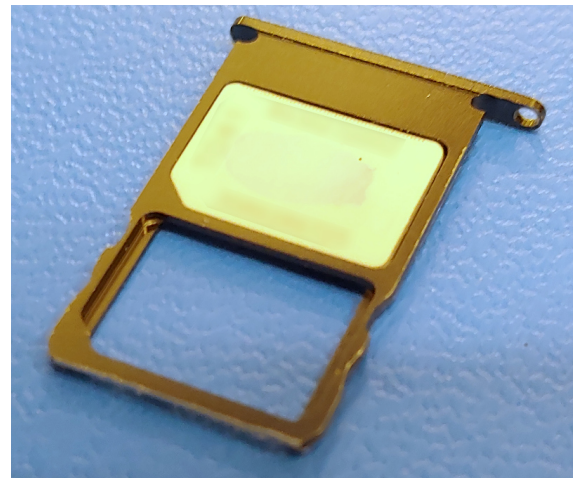
2. Insert the SIM removal tool as straight as possible into the pinhole and push. The tray will pop out.



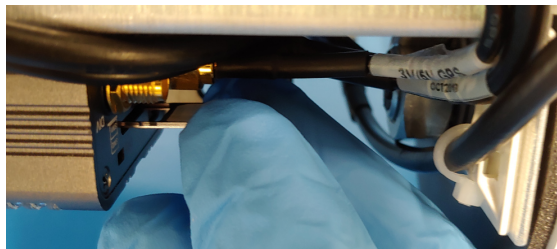
3. Pull the tray out of the modem.



4. Put the micro SIM-card into the SIM1 position, with the electrical contacts facing down.



5. Insert the tray with the SIM-card installed and its electrical contacts facing downward. Handle it with care to prevent the SIM from falling out of the tray.



6. Push the tray in until flushed with the modem's chassis. Avoid moving the RBRcervello until the tray is fully inserted to prevent the SIM from falling out of place.



Most cellular providers require no further configuration. If telemetry difficulties arise, or if you know your provider requires additional APN configuration, please contact [RBR](#).

Iridium RUDICS

For RBRcervellos equipped with Iridium RUDICS telemetry, a fixed SIM-card is already installed. This SIM-card can be used worldwide with airtime services provided by [MetOcean Telematics](#). If you would like to use another airtime provider, please inform RBR before ordering.

Unlike Iridium SBD, where data recipients are configured on a per-device basis, RUDICS modems are associated with a shared configuration, known as a "RUDICS group". If you subscribe to airtime services through MetOcean Telematics and are using RBR-provided data hosting, you can use RBR's RUDICS group: JOUBEH_RBRCERVELLO_STD_PROD for US-based data hosting (<https://data.rbr-global.com>) or JOUBEH_RBRCERVELLO_2_STD_PROD for China-based data hosting (<https://data.rbr.cn>). Otherwise, you will need to set up a RUDICS group through your provider of choice. A setup fee for the group will apply. To use your data controller with RBR data hosting, the RUDICS group configuration is as follows:

US-based data hosting

RUDICS type	standard (Standard or PPP)
Mobile-originated terminating IP	34.194.96.152
Mobile-originated terminating port	9131
Mobile-terminated originating IP	34.194.96.152 (not currently used by RBR)

China-based data hosting

RUDICS type	standard (Standard or PPP)
Mobile-originated terminating IP	54.223.67.137
Mobile-originated terminating port	9131
Mobile-terminated originating IP	54.223.67.137 (not currently used by RBR)

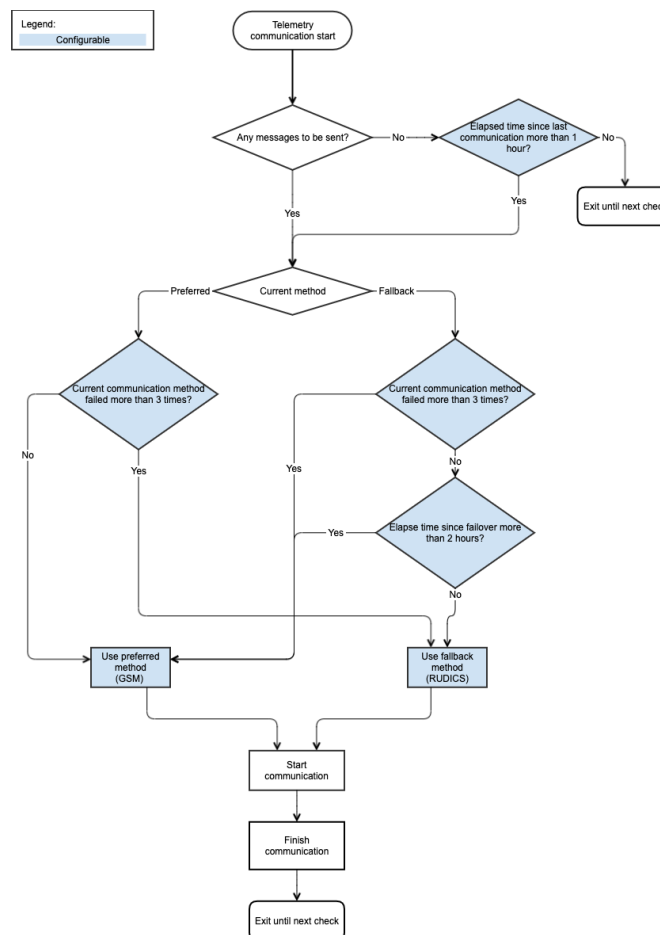
Upon setup, indicate to your airtime provider:

- the RUDICS group name to provision against
- the unique ID (ICCID) of the SIM card installed in the modem

Contact [RBR support](#) to determine the ICCID of your SIM-card. The IMEI of the modem is not required, as that is only necessary for provisioning SBD service, which is not used by the RBRcervello.

Failover

RBRcervellos equipped with a dual-mode modem have a failover mechanism which determines its communication method. Usually the preferred method would be GSM, due to lower cost and faster speeds, and the fallback method would be Iridium RUDICS.



4.3 Deployment preparation

Configuration

Each *RBRcervello* is configured by RBR to work with a specific instrument. For details particular to your instrument or to change the configuration, please contact [RBR](#).



Use your instruments or sub-surface modems (SSM) only with a properly configured data controller.

Failure to configure the *RBRcervello* with correct deployment parameters may compromise your mission. At best, invalid data will be reported; at worst, the deployment will be unsuccessful.

Bench testing



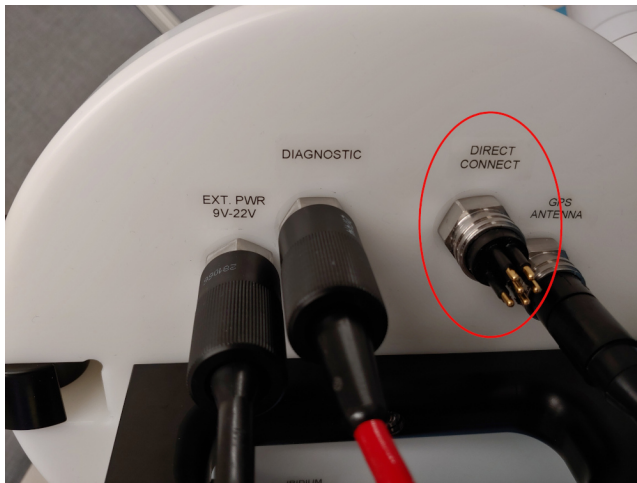
- A computer running Ruskin
- A USB cable as appropriate to connect your instrument (*RBRconcerto*³ or *RBRmaestro*³) to your computer
- A test loop for the MLM
- An RS-232 patch cable

An end-to-end bench test of the system will exercise all of its individual components and confirm that:

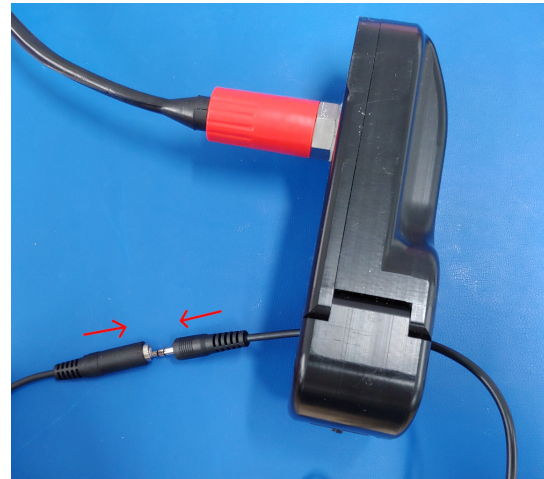
- The *RBRcervello* telemetry modems (GSM and Iridium RUDICS) are operational
- The mooring line modem (MLM) and head-end modem (HEM) can communicate with the sub-surface modems (SSM)
- The *RBRcervello* can communicate with the instrument via the MLM

To bench-test the system, connect all of its components together:

1. Remove the internal assembly of the *RBRcervello* from the housing (optional).
2. Connect the test loop cable to the *RBRcervello*.
3. Connect the instruments to their respective ferrite holders.
4. Pass the test loop through the ferrite holders.
The loop does not need to make contact with any part of the holder: passing through the middle of the ferrite is all that is required for functionality.
5. Connect the MCIL-6-FS end of the patch cable to the diagnostic port.
6. Connect the USB end of the patch cable to your computer.
7. Connect the batteries in the lower section of the internal frame of the *RBRcervello* to the connector labeled “Battery”.
8. Turn the switch on, if not done already.
In case the *RBR cervello* was already powered, press any key while in the serial terminal to wake it up. The *RBR cervello* will boot up. This process will take up to two minutes. When booted, the data controller will search for and connect to an available instrument, and determine whether it needs to download any data from it.
9. Once in the terminal, run the three basic diagnostic tasks: MLM, RUDICS, and GSM.



DIRECT CONNECT port



MLM test loop through ferrite holder

Diagnosing MLM

In the terminal window, press "Enter" a couple of times and wait for the "RBRcervello>" prompt. Type "diagnose mlm" and press "Enter". Immediately, the MLM test routine will start running. This routine will assess communication with the HEM and SSM attached to the line, check their configuration, and perform a bit-error-rate test.

Follow the instructions on the screen as sometimes it prompts for user interaction.

```

1 RBRcervello> diagnose mlm
2 Checking deployment status...
3 Stopping services...
4 Waiting for publisher to terminate...
5 Stopping periodic command scheduler: cron.
6 Starting MLM test
7 I think the HEM is on /dev/ttyS3 at 115200 baud.
8 Trying to wake the HEM...
9      RBR HEM-1000 1.300 208882
10 Found HEM 208882.
11 HEM firmware version 1.300 >= 1.300.
12      commands now unlocked
13 Checking HEM configuration...
14 Checking:      baud rate BAUD: 115200
15 Setting:      baud rate BAUD: 115200.
16 .
17 .
18 .
19 Setting:      ber pattern BERPAT: RAND
20 Checking:      ber length (bytes) BERLEN: x0800
21 Setting:      ber length (bytes) BERLEN: x0800
22
23 Ensuring there is no open SSM channel before attempting any channel activity...
24 No previously open channel.
25 Attempting SSM discovery:
26 Found SSM 999888
27 Found SSM 989989
28 Discovery complete
29 Waiting for channel cooldown...
30 .
31 .

```

```
32 .
33 MLM communication looks good.
34 Restarting services...
35 Starting periodic command scheduler: cron.
36 RBRcervello>
```

Diagnosing GSM

This test requires the RBRcervello to have an activated SIM-card installed in the GSM modem as described in [Telemetry](#). If GSM is not going to be used in this deployment, this test can be omitted.

After finishing the previous test, wait for the "RBRcervello>" prompt to appear again. Type "diagnose gsm" and press enter. The GSM test will wait for any ongoing communication to finish and will diagnose the connection to the internet via the GSM modem.

```
1 RBRcervello> diagnose gsm
2 Checking deployment status...
3 Stopping services...
4 Waiting for publisher to terminate...
5 Stopping periodic command scheduler: cron.
6 Starting GSM test
7 I think the GSM modem is on /dev/ttyS4 at 230400 baud.
8 Waiting for the modem to come up...
9 Modem is up.
10 Waiting for PPP connection to the modem...
11 Established PPP connection to the modem. Modem identifiers:
12 IMEI: 867698099999999
13 IMSI: 302720599999999
14 ICCID: 89302720512345678987
15 Waiting for the modem to connect to the GSM network....
16 Reconnecting for Internet access (1/2)...
17   Bringing PPP connection down...
18   Bringing PPP connection back up...
19   Waiting for the PPP connection to become the default route
20 Making sure we can access the web...
21 The modem connection is up.
22 Brought the gsm connection up successfully.
23 /usr/local/wirewalker-
   controller/diagnostics/../../publisher/modes/gsm/netpty/bin/netpty: socket was closed
24 messages-read: no process found
25 netpty: no process found
26 The serial link has been brought down.
27 Powering off the modem.
28 Restarting services...
29 Starting periodic command scheduler: cron.
30 RBRcervello>
```

Diagnosing RUDICS

The RUDICS diagnostic task will test the entire communication pathway to the Iridium Satellite network. For this test to succeed, the RBRcervello needs to be positioned outdoors, with a clear view of the sky and with as few obstructions as possible.

After the "RBRcervello>" prompt appears again, type "diagnose rudics" and press enter. This routine will turn on the RUDICS modem and then will attempt to dial to the Iridium network as configured in [Telemetry](#). It can identify failures in the modem, signal strength, or activation issues of the SIM-card.


```

1 RBRcervello> diagnose rudics
2 Checking deployment status...
3 Stopping services...
4 Waiting for publisher to terminate...
5 Stopping periodic command scheduler: cron.
6 Starting RUDICS test
7 I think the RUDICS modem is on /dev/ttyS4 at 2400 baud.
8 Waiting for the modem to come up...
9 Teraform v1.1.2 (built 2021-10-12T20:17:02+0000)
10 2021-11-12 20:26:24 src/teraform.c:364 [INFO ]: Modem: "/dev/ttyS4"
11 2021-11-12 20:26:24 src/teraform.c:367 [INFO ]: Dial number: "0088169999999"
12 2021-11-12 20:26:24 src/teraform.c:388 [INFO ]: Configuring modem...
13 2021-11-12 20:26:24 src/teraform.c:432 [INFO ]: Waiting for modem to be
    available...
14 2021-11-12 20:26:24 src/teraform.c:451 [INFO ]: Checking IMEI...
15 2021-11-12 20:26:24 src/teraform.c:451 [INFO ]: IMEI: 300125099999999
16 2021-11-12 20:26:24 src/teraform.c:478 [INFO ]: Checking ICCID...
17 2021-11-12 20:26:24 src/teraform.c:478 [INFO ]: ICCID: 898816999999999
18 2021-11-12 20:26:24 src/teraform.c:488 [INFO ]: Disabling flow control...
19 2021-11-12 20:26:25 src/teraform.c:520 [INFO ]: Waiting for satellite signal...
20 2021-11-12 20:26:31 src/teraform.c:520 [INFO ]: Found signal of strength 5/5.
21 2021-11-12 20:26:31 src/teraform.c:530 [INFO ]: Configuring data connection...
22 2021-11-12 20:26:31 src/teraform.c:564 [INFO ]: Dialing data connection...
23 2021-11-12 20:26:40 src/teraform.c:564 [INFO ]: Connection dialed.
24 The modem connection is up.
25 Brought the rudics connection up successfully.
26 Teraform v1.1.2 (built 2021-10-12T20:17:02+0000)
27 2021-11-12 20:26:40 src/teraform.c:364 [INFO ]: Modem: "/dev/ttyS4"
28 2021-11-12 20:26:43 src/teraform.c:584 [INFO ]: Escaping from data call...
29 2021-11-12 20:26:44 src/teraform.c:594 [INFO ]: Disconnecting data call...
30 The serial link has been brought down.
31 Powering off the modem.
32 Restarting services...
33 Starting periodic command scheduler: cron.
34 RBRcervello>

```



If any of the tests result in failure, go to [troubleshooting](#), or contact [RBR support](#).

Clearing the controller and instruments

Before deployment, clear all data from the RBRcervello and the instruments that would be attached to it.

Clearing the data is also known as "scrubbing". Commands are provided in the diagnostic menu for scrubbing the [instrument](#) and the [controller](#). Both commands require the RBRcervello's deployment to be [disabled](#).

Follow the steps below.

1. Disable the RBRcervello using the "[disable](#)" command.

```

1 RBRcervello> disable
2 Deployment stopped

```

2. Clear the memory in all instruments attached using the "[scrub-instruments -a](#)" command. This might take several minutes, depending on the number of instruments.

```

1 RBRcervello> scrub-instrument -a
2 Clearing memory...

```

```
3 Instrument 01: success
4 Instrument 02: success
```

3. Re-check the status of the instruments using the "[status](#)" command.

```
1 RBRcervello> status
2
3 RBRcervello
4 Serial number: 208685
5 Part number: 0011493
6 Cervello firmware version: 1.16.0
7
8 Clock: 2021-10-29 02:24:35
9
10 Cervello status: disabled
11 Cervello internal battery: 13.68 V
12 Cervello external battery: 1.31 V
13
14 Storage used      : 168 MB
15 Storage remaining: 14355 MB
16 Storage size     : 15299 MB
17
18 Telemetry last update: 2021-10-29 02:00:09
19 Telemetry last result: success
20 Telemetry last mode  : rudics
21
22 GPS last update      : 2021-10-29 02:17:59
23 GPS last result      : fixacquired
24 GPS last known position: 45.349128 -75.917473
25
26 Instrument 01 last update : 2021-10-29 02:24:06
27 Instrument 01            : disabled
28 Instrument 01 internal battery: 5.11 V
29 Instrument 01 external battery: 0.00 V
30
31 Download remaining: 0B
```

4. Clear the data from the RBRcervello using the "[scrub-controller](#)" command.

```
1 RBRcervello> scrub-controller
2 Are you sure you want to scrub the controller? (y/N)y
3
4 Removing files from
5   /mnt/sdcard/data...
6   /mnt/sdcard/logs...
7   /mnt/sdcard/lost+found...
8   /mnt/sdcard/messages...
9   /mnt/sdcard/publisher...
10  /mnt/sdcard/queues...
11  /mnt/sdcard/responses...
12  /mnt/sdcard/tasks...
```

4.4 Deploying the RBRcervello Antarctica

Installing the RBRcervello Antarctica on site

Follow the steps below to set up the RBRcervello Antarctica on site.

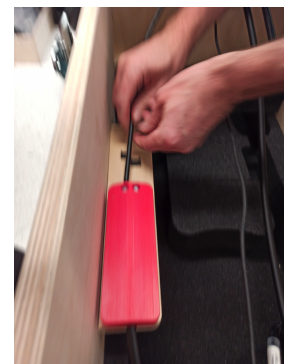
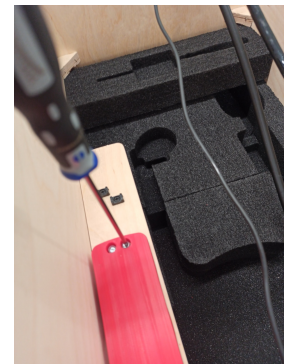


- 5mm hex key
- Philips #2 screwdriver
- zip ties
- cutting tool (not included!)

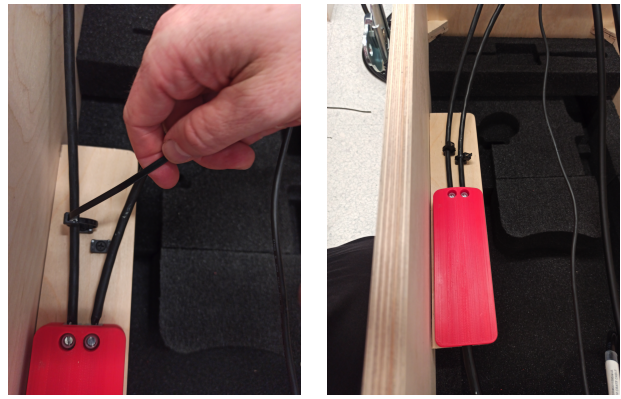
1. Open the crate.
2. Install the mooring line modem (MLM) lines.
 - a. Cut the mooring line to the appropriate length to fit in the crate.
 - b. Strip both ends of the line by approximately 1cm.



- c. Attach each of the MLM lines to the MLM lines junction box. Use the screwdriver provided.



- d. Secure each of the MLM lines to the crate. Use the zip ties provided.



- e. Secure each of the MLM lines to the crate using their dedicated clamping slot. Use the 5mm hex key provided.

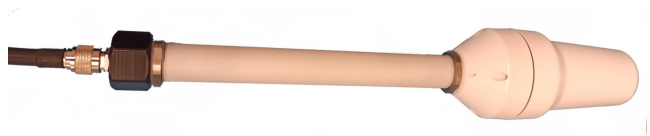


- f. Attach the MLM lines junction box cable to the RBRcervello end-cap. Use the connector labeled "DIRECT CONNECT".

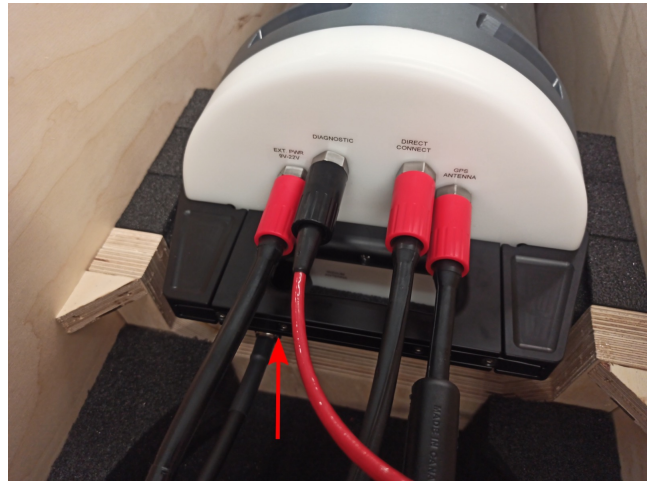


3. Install the Iridium antenna.

- a. Attach the Iridium antenna to its cable.



- b. Attach the Iridium antenna cable to the RBRcervello end-cap. Use the connector labeled "IRIDIUM ANTENNA".



- c. Secure the Iridium antenna cable to the crate via its dedicated clamping slot. Use the 5mm hex key provided.



4. Install the GPS antenna.

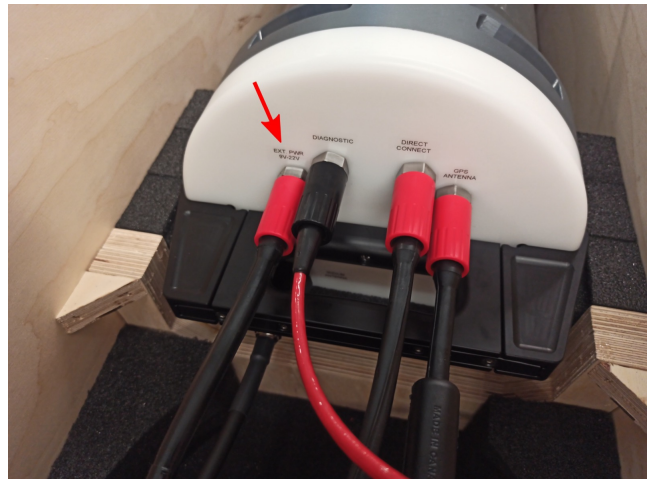
- a. Attach the GPS antenna to the RBRcervello end-cap. Use the connector labeled "GPS ANTENNA".



- b. Secure the GPS antenna cable to the crate via its dedicated clamping slot. Use the 5mm hex key provided.



- 5. Install the external power source (if applicable).
 - a. Attach the external power cable to the RBRcervello end-cap. Use the connector labeled "EXT. PWR".



- b. Secure the external power cable to the crate via its dedicated clamping slot. The tab of the slot has two different sides to accommodate 6.3mm and 9.5mm cable diameters. Use the 5mm hex key provided.



Enabling the RBRcervello

- 1. Attach the provided patch cable to the RBRcervello end-cap. Use the connector labeled "DIAGNOSTIC".



2. Follow the steps in [Using the diagnostic port](#) to set up the terminal and access the RBRcervello's menu.
3. Enable the RBRcervello by using the "enable" command.
4. Use the "status" command to check the status of all instruments attached to the mooring line. Verify that they are all logging.



The instrument status updates can take up to 20 minutes, depending on the number of instruments attached to the MLM line.

```
1 RBRcervello> status
2
3 RBRcervello
4 Serial number: 208685
5 Part number: 0011493
6 Cervello firmware version: 1.16.0
7
8 Clock: 2021-10-29 02:24:35
9
10 Cervello status: logging
11 Cervello internal battery: 13.68 V
12 Cervello external battery: 1.31 V
13
14 Storage used      : 168 MB
15 Storage remaining: 14355 MB
16 Storage size     : 15299 MB
17
18 Telemetry last update: 2021-10-29 02:00:09
19 Telemetry last result: success
20 Telemetry last mode  : rudics
21
22 GPS last update      : 2021-10-29 02:17:59
23 GPS last result      : fixacquired
24 GPS last known position: 45.349128 -75.917473
25
26 Instrument 01 last update      : 2021-10-29 02:24:06
27 Instrument 01                  : logging
28 Instrument 01 internal battery: 5.11 V
29 Instrument 01 external battery: 0.00 V
30
31 Instrument 02 last update      : 2021-10-29 02:23:37
32 Instrument 02                  : logging
33 Instrument 02 internal battery: 4.74 V
34 Instrument 02 external battery: 0.00 V
35
36 Instrument 03 last update      : 2021-10-29 02:20:45
37 Instrument 03                  : logging
38 Instrument 03 internal battery: 4.69 V
39 Instrument 03 external battery: 0.00 V
40
41 Instrument 04 last update      : 2021-10-29 02:23:02
42 Instrument 04                  : logging
43 Instrument 04 internal battery: 4.90 V
44 Instrument 04 external battery: 0.00 V
45
46 Download remaining: 0B
```


5 Features

5.1 USB interface

The RBRcervello has a USB interface for retrieving data from the unit and for installing firmware and configuration updates. It is compatible with FAT32-formatted USB mass storage devices and can be used with flash drives. Bus-powered hard drives are not recommended as the RBRcervello may not provide sufficient power.

Retrieving data



Tools required

A blank, FAT32-formatted USB flash memory stick, at least 512MB in size

To retrieve data from the RBRcervello, connect a FAT32-formatted USB storage device to its USB port while it is powered on and awake. All data will be copied from the data controller to the storage device.



An RBRcervello Antarctica could be in a deep sleep state when the USB stick is connected. Wake it up by connecting the diagnostic port and pressing "Enter" on the serial terminal. When the "RBRcervello>" prompt appears, plug in the USB stick.



Connect only flash memory storage media (i.e., memory sticks or SSDs) to the USB port of the data controller. Attempted use of portable hard drives may damage the RBRcervello.

Applying updates



Tools required

A blank, FAT32-formatted USB flash memory stick, at least 512MB in size

Firmware and configuration updates for the data controller are delivered in the form of ZIP archives. To apply these updates, extract the archive into the root of an empty, FAT32-formatted USB storage device. The structure of all directories within the archive, including the top-level rbr cervello directory will be retained. After decompressing, the contents of the USB stick will resemble this structure:

Name	Date Modified	Size	Kind
▼ rbr cervello	Today at 5:57 PM	--	Folder
▼ update	Today at 5:57 PM	--	Folder
init	Oct 12, 2021 at 4:56 PM	3 KB	Unix Ex...able File
rbr cervello...date.tar.gz	Sep 17, 2021 at 3:28 PM	3.5 MB	gzip co...archive
SHA1SUMS	Sep 17, 2021 at 3:28 PM	68 bytes	Unix Ex...able File
▼ wirewalker	Today at 5:57 PM	--	Folder
update	Today at 5:57 PM	--	Folder
init	Oct 12, 2021 at 4:56 PM	115 bytes	Unix Ex...able File

Some archive extraction programs, including Safari and the macOS Finder, may modify directory structures during decompression. If this happens, either recreate directories as necessary to match the structure depicted above or use a program that does not modify contents during extraction (e.g., [7-Zip](#) on Windows or [The Unarchiver](#) on macOS).



Always retrieve the data from the RBRcervello and clear it completely before applying any updates.

As when retrieving data from the RBRcervello, connect the USB storage device to the USB port on the data controller.

Light indicator

During data transfer or applying updates, the red light on the RBR*cervello* will flash steadily. Once all data is transferred or updates installed, the red light will cease flashing and the green light will turn on. At that point, the storage device may be disconnected safely. The green light will turn off.

If an error occurs during the process, the red light will repeatedly flash the Morse code representation of “SOS”: three short flashes, three long flashes, and three short flashes. If this occurs, remove the storage device.

Once the red light has turned off and stays off for several seconds, reconnect the storage device and retry.

5.2 Data hosting

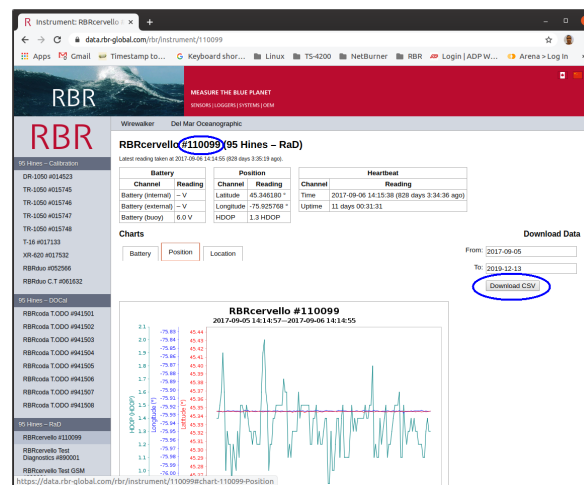
The RBR*cervello* is optionally supplied with real-time telemetry in the form of GSM cellular and Iridium Satellite modems. These send data to the RBR data hosting service, which is accessible at `https://data.rbr-global.com/ClientReference``. Each client site may be public or password protected. One year of data hosting service is included with each RBR*cervello*. After the first year, contact [RBR](#) to purchase additional years of service.

Your data is stored on the RBR data-hosting portal in the form of comma-separated value (CSV) files.

Data controllers report data under two different serial numbers: one for the attached instrument (RBR*concerto*³ or RBR*maestro*³), and one for diagnostic information (battery levels and GPS coordinates). Remember to download from the appropriate instrument.

Obtaining data from the RBR data-hosting portal

Navigate to <https://data.rbr-global.com/rbr> (replacing RBR with your customer name) and click "Download CSV".



Obtaining data using a shell script

Use the `getcsvdata.sh` script to poll and download data for a particular instrument.

After downloading the script, you will have to change the file permissions to enable execution. For example, to permit all users on the system to execute the script:

```
1 chmod +x getcsvdata.sh
```

Call the script using your customer URL slug, serial number, start date, and end date as arguments. For example, to download all data for the RBR's device "110099" from September 1, 2017 to December 31, 2020, use the script with this command:

```
1 ./getcsvdata.sh rbr 110099 2017-09-01 2020-12-31
```

Manually downloading data files

Retrieve exports of instrument data by making HTTP GET requests via this URL pattern:

```
1 https://data.rbr-global.com/customer/download/serial?from=A&to=B
```

or

```
1 https://data.rbr-global.com/customer/download/serial?timespan=C
```

- `customer` is the customer slug; e.g. `rbr`, `csiro`
- `serial` is the serial number of the instrument for which data should be retrieved
- `A` and `B` are UTC dates in YYYY-MM-DD format and respect the instrument timezone. Alternatively, they can be YYYY-MM-DDTHH:MM:SS.
- `C` is an integer number of days

The first format will yield a CSV of all data from dates `A` to `B`, inclusive of both. The second format will yield a CSV of all data from the last $C \times 24$ hours (*not* the most recent $C \times 24$ hours of data available!).

For example, use the above URL format within a "curl" command to obtain the data from RBR's instrument with serial number 080296 from September 8, 2016 to September 9, 2016:

```
1 curl --location --remote-name --remote-header-name --compressed 'http://data.rbr-global.com/rbr/download/080296?from=2016-09-08&to=2016-09-09'
```

It can also be more granular, from September 8, 2016, at 10:00 to 20:00:

```
1 curl --location --remote-name --remote-header-name --compressed 'http://data.rbr-global.com/rbr/download/080296?from=2016-09-08T10:00:00&to=2016-09-08T20:00:00'
```

Remember to enclose the URL in quotation marks, lest your shell split the command around the ampersand (&) character.

In general, restrict yourself to downloading around one or two days of data at a time, and later concatenating the results. An instrument sampling at 6Hz will generate almost 100MB of CSV data per day. Large transfers may time out during the download process or your connection may be unexpectedly dropped.

Low bandwidth transfers

If your computer has relatively low bandwidth, use the [getcsvdata.sh](#) script described above to acquire data and save them to a server with high bandwidth, always-on connection. Subsequently, transfer only the difference using the "rsync" command.

```
1 rsync --verbose --archive --partial --progress --compress  
  myusername@my.server.address:/my/data/path/RBR-080296.csv .
```

Downloads

[getcsvdata.sh](#)

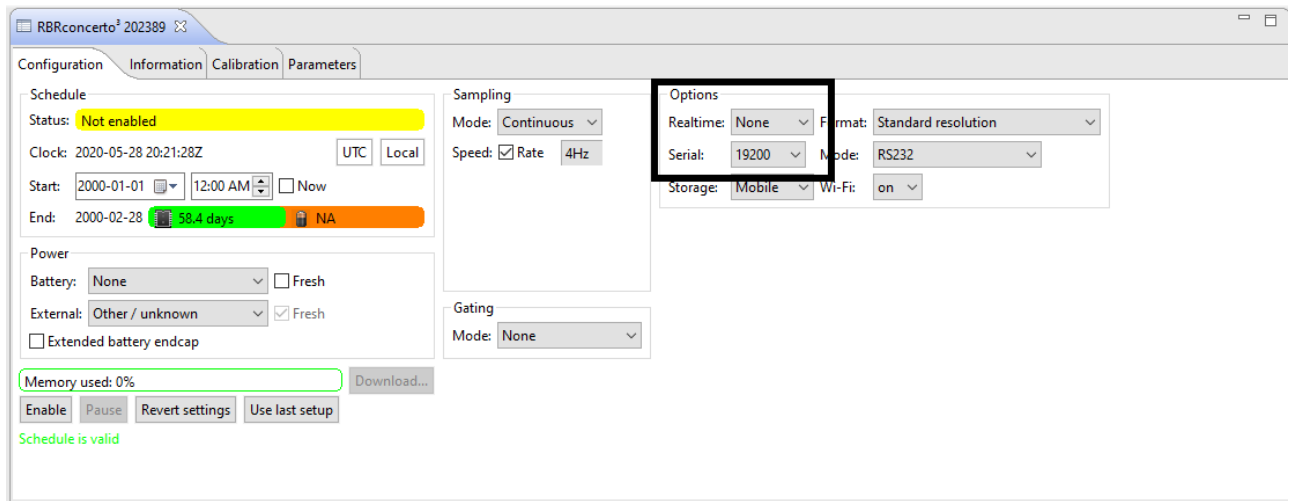
6 Troubleshooting

Because the RBRcervello system comprises multiple components, troubleshooting may be a multi-stage process. It involves separate procedures to verify correct functionality of each.

Follow the steps outlined in [Using the diagnostic port](#) to open the command menu. Refer to [Deployment preparation](#) for the detailed description of how to run diagnostic tests.

Communication issues

1. Using the [status](#) command, check the status of the instrument.
2. If the instrument status is "commchannelerror", run the [MLM diagnostic task](#).
3. If the instrument status is "loggererror", ensure your logger is communicating at 19200baud (use Ruskin to check).



The screenshot shows the RBRconcerto configuration window for device 202389. The 'Options' tab is selected and highlighted with a black box. Within the 'Options' section, the 'Serial' dropdown menu is set to '19200'. Other visible settings include 'Realtime' set to 'None', 'Format' set to 'Standard resolution', 'Mode' set to 'RS232', and 'Storage' set to 'Mobile'. The 'Wi-Fi' status is 'on'. The 'Schedule' section shows the status as 'Not enabled' and the clock as '2020-05-28 20:21:28Z'. The 'Power' section shows 'Battery' as 'None' and 'External' as 'Other / unknown'. The 'Memory used' is 0%.



If you change any settings on Ruskin, clear the data from the instrument and the data controller, as described in [Deployment preparation](#).

GSM

Run the [GSM diagnostic task](#) to troubleshoot common errors, such as a bad SIM-card or poor Internet connection.

Failure, bad SIM-card

```
1 RBRcervello> diagnose gsm
2
3 Checking deployment status...
4 Stopping services...
5 Waiting for publisher to terminate...
6 Stopping periodic command scheduler: cron.
7 Starting GSM test
8 I think the GSM modem is on /dev/ttyS4 at 230400 baud.
9 Waiting for the modem to come up...
10 Modem is up.
11 Waiting for PPP connection to the modem...
12 Established PPP connection to the modem. Modem identifiers:
13 IMEI: N/A
14 IMSI: N/A
15 ICCID: N/A
16 Waiting for the modem to connect to the GSM
```

```

network.....Hit the connection
timeout! Giving up.
17 Test failure: failed to bring up connection!
18 /usr/bin/poff: No pppd is running.  None stopped.
19 messages-read: no process found
20 netpty: no process found
21 The serial link has been brought down.
22 Powering off the modem.
23 Restarting services...
24 Starting periodic command scheduler: cron.
25
26 RBRcervello>

```

If so, remove and re-insert the SIM card in the tray in the SIM1 position, as explained in the [Telemetry](#) section.

RUDICS

Run the [RUDICS diagnostic task](#) to identify failures in the modem, signal strength, or activation issues of the SIM-card.

Failure, no satellite signal

This error indicates there is a connection problem with the antenna, or the antenna is obstructed.

```

1 RBRcervello> diagnose rudics
2 Checking deployment status...
3 Stopping services...
4 Waiting for publisher to terminate...
5 Stopping periodic command scheduler: cron.
6 Starting RUDICS test
7 I think the RUDICS modem is on /dev/ttyS4 at 2400 baud.
8 Waiting for the modem to come up...
9 Teraform v1.1.2 (built 2021-10-12T20:17:02+0000)
10 2021-11-12 20:42:48 src/teraform.c:364 [INFO ]: Modem: "/dev/ttyS4"
11 2021-11-12 20:42:48 src/teraform.c:367 [INFO ]: Dial number: "0088160999999"
12 2021-11-12 20:42:48 src/teraform.c:388 [INFO ]: Configuring modem...
13 2021-11-12 20:42:48 src/teraform.c:432 [INFO ]: Waiting for modem to be
    available...
14 2021-11-12 20:42:48 src/teraform.c:451 [INFO ]: Checking IMEI...
15 2021-11-12 20:42:48 src/teraform.c:451 [INFO ]: IMEI: 3001250619999999
16 2021-11-12 20:42:48 src/teraform.c:478 [INFO ]: Checking ICCID...
17 2021-11-12 20:42:49 src/teraform.c:478 [INFO ]: ICCID: 8988169763060999999
18 2021-11-12 20:42:49 src/teraform.c:488 [INFO ]: Disabling flow control...
19 2021-11-12 20:42:49 src/teraform.c:520 [INFO ]: Waiting for satellite signal...
20 2021-11-12 20:42:52 src/teraform.c:520 [INFO ]: No signal found. Waiting to try
    again.
21 2021-11-12 20:43:03 src/teraform.c:520 [INFO ]: Waiting for satellite signal...
22 2021-11-12 20:43:03 src/teraform.c:520 [INFO ]: No signal found. Waiting to try
    again.
23 2021-11-12 20:43:14 src/teraform.c:520 [INFO ]: Waiting for satellite signal...
24 2021-11-12 20:43:18 src/teraform.c:520 [INFO ]: No signal found. Waiting to try
    again.
25 2021-11-12 20:43:29 src/teraform.c:520 [INFO ]: Waiting for satellite signal...
26 2021-11-12 20:43:29 src/teraform.c:520 [INFO ]: No signal found after the final
    attempt.
27 2021-11-12 20:43:29 src/teraform.c:520 [ERROR]: Failed after 4 attempts.
28 Failed to dial connection! Giving up.
29 Test failure: failed to bring up connection!
30 Teraform v1.1.2 (built 2021-10-12T20:17:02+0000)

```

```

31 2021-11-12 20:43:29 src/teraform.c:364 [INFO ]: Modem: "/dev/ttyS4"
32 2021-11-12 20:43:32 src/teraform.c:584 [INFO ]: Escaping from data call...
33 2021-11-12 20:43:35 src/teraform.c:584 [INFO ]: Escaping from data call...
34 2021-11-12 20:43:38 src/teraform.c:584 [ERROR]: Failed after 2 attempts.
35 The serial link has been brought down.
36 Powering off the modem.
37 Restarting services...
38 Starting periodic command scheduler: cron.
39 RBRcervello>

```

Failure, no carrier or activation issue

This failure usually occurs because of a bad connection with the network or when the SIM-card has not been successfully activated.

```

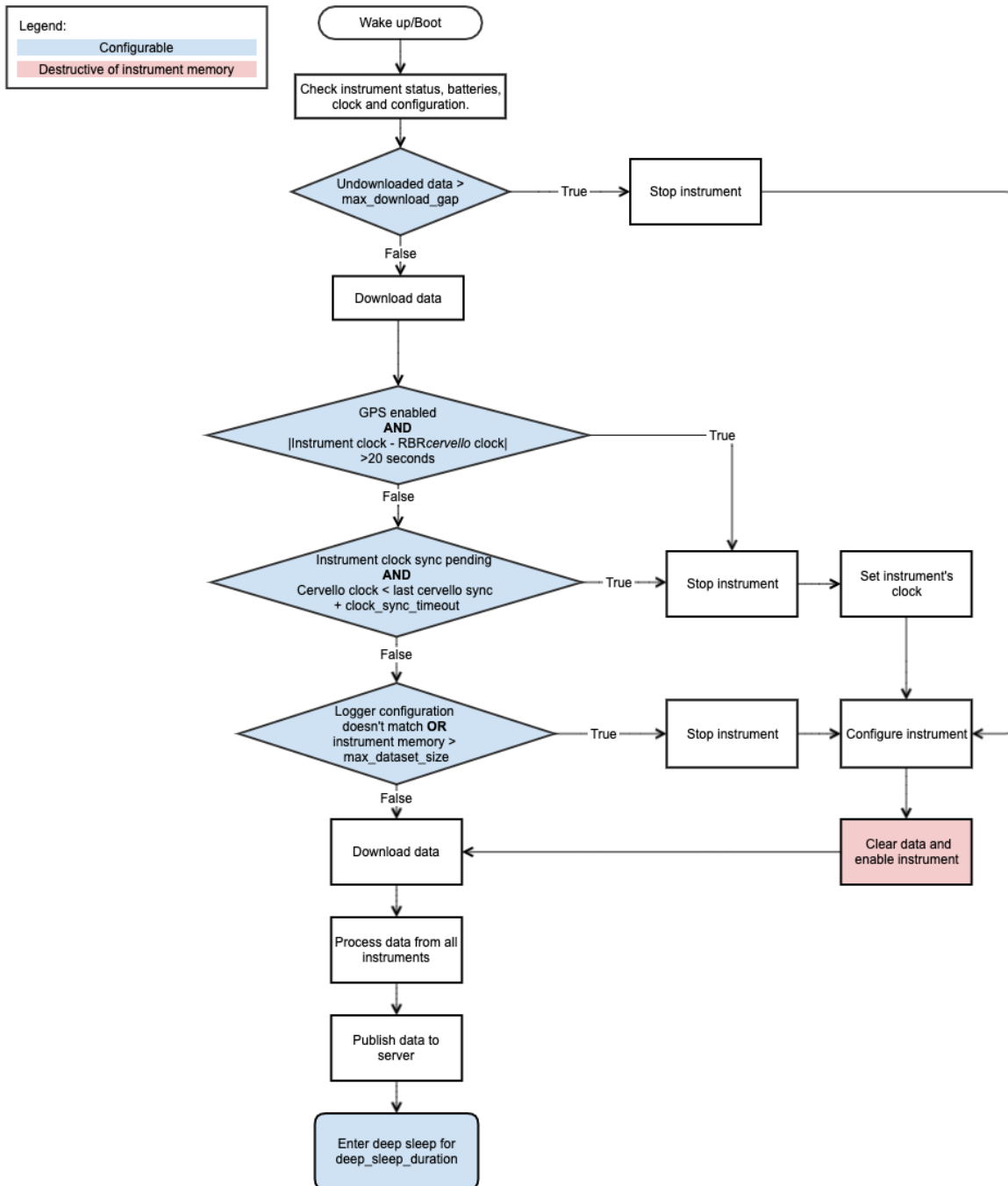
1 RBRcervello> diagnose rudics
2 Checking deployment status...
3 Stopping services...
4 Waiting for publisher to terminate...
5 Stopping periodic command scheduler: cron.
6 Starting RUDICS test
7 I think the RUDICS modem is on /dev/ttyS4 at 2400 baud.
8 Waiting for the modem to come up...
9 Teraform v1.1.2 (built 2021-10-12T20:17:02+0000)
10 2021-11-12 20:54:02 src/teraform.c:364 [INFO ]: Modem: "/dev/ttyS4"
11 2021-11-12 20:54:02 src/teraform.c:367 [INFO ]: Dial number: "0088160999999"
12 2021-11-12 20:54:02 src/teraform.c:388 [INFO ]: Configuring modem...
13 2021-11-12 20:54:02 src/teraform.c:432 [INFO ]: Waiting for modem to be
    available...
14 2021-11-12 20:54:02 src/teraform.c:451 [INFO ]: Checking IMEI...
15 2021-11-12 20:54:03 src/teraform.c:451 [INFO ]: IMEI: 300125061999999
16 2021-11-12 20:54:03 src/teraform.c:478 [INFO ]: Checking ICCID...
17 2021-11-12 20:54:03 src/teraform.c:478 [INFO ]: ICCID: 8988169234002999999
18 2021-11-12 20:54:03 src/teraform.c:488 [INFO ]: Disabling flow control...
19 2021-11-12 20:54:03 src/teraform.c:520 [INFO ]: Waiting for satellite signal...
20 2021-11-12 20:54:12 src/teraform.c:520 [INFO ]: Found signal of strength 1/5.
21 2021-11-12 20:54:12 src/teraform.c:530 [INFO ]: Configuring data connection...
22 2021-11-12 20:54:12 src/teraform.c:564 [INFO ]: Dialing data connection...
23 2021-11-12 20:54:12 src/teraform.c:564 [INFO ]: Dial reported no carrier. Waiting
    40s to try again.
24 2021-11-12 20:54:52 src/teraform.c:564 [INFO ]: Dialing data connection...
25 2021-11-12 20:54:52 src/teraform.c:564 [INFO ]: Dial reported an error.
26 2021-11-12 20:54:52 src/teraform.c:564 [ERROR]: Failed after 2 attempts.
27 Failed to dial connection! Giving up.
28 Test failure: failed to bring up connection!
29 Teraform v1.1.2 (built 2021-10-12T20:17:02+0000)
30 2021-11-12 20:54:52 src/teraform.c:364 [INFO ]: Modem: "/dev/ttyS4"
31 2021-11-12 20:54:55 src/teraform.c:584 [INFO ]: Escaping from data call...
32 2021-11-12 20:54:58 src/teraform.c:584 [INFO ]: Escaping from data call...
33 2021-11-12 20:55:01 src/teraform.c:584 [ERROR]: Failed after 2 attempts.
34 The serial link has been brought down.
35 Powering off the modem.
36 Restarting services...
37 Starting periodic command scheduler: cron.
38 RBRcervello>

```


7 Reference

7.1 Deployment behaviour

The RBR*cervello* will oversee deployment of attached instruments, configure instrument settings, and start the logging schedule.



7.2 Diagnostic menu

The diagnostic commands use the following formatting conventions:

1. Examples of literal input and output are shown in **bold** type.
2. When an item or group of items is optional, it is enclosed in `[square brackets]`.
3. Where an item can be only one of several options, options are separated by vertical bars, `|`.
4. Placeholders for variable fields are in `<italics enclosed in angle brackets>`.

7.2.1 status

7.2.1.1 Name

status

7.2.1.2 Synopsis

Provide an overview of the system status.

7.2.1.3 Usage

status [-h|--help] | [-v|--version]

status [-p|--progress]

status [-g|--gps]

7.2.1.4 Options

-h, --help

Display this help message and exit.

-v, --version

Output version information and exit.

-p, --progress

Show progress bars for downloads after displaying system overview. It will update indefinitely update the progress unless program is exited.

-g, --gps

Trigger and wait for a GPS acquisition before displaying the remaining of the system overview

7.2.1.5 Description

Prints a status overview of the controller including battery information, storage usage, connected instruments status.

General overview:

- **Serial number:** serial number of the RBR*cervello*.
- **Part number:** part number of the RBR*cervello*.
- **Cervello firmware version:** firmware version of the RBR*cervello*.
- **Clock:** current clock of the RBR*cervello*.

RBRcervello status

- **Cervello status:** current status of the RBRcervello, either **disabled** or **logging**.
- **Cervello internal battery:** RBRcervello internal battery voltage in Volts.
- **Cervello external battery:** RBRcervello external battery voltage in Volts.

Storage

- **Storage used:** RBRcervello memory used in MB.
- **Storage remaining:** RBRcervello memory still available in MB.
- **Storage size:** RBRcervello memory total size in MB.

Telemetry

- **Telemetry last update:** date/time of the last telemetry attempt, or **N/A**.
- **Telemetry last result:** the result of the last telemetry attempt, either **success**, **failed over X times** or **N/A**.
- **Telemetry last mode:** mode of last telemetry attempt, either **gsm**, **rudics** or **N/A**.

GPS

- **GPS last update:** date/time of the last GPS acquisition attempt.
- **GPS last result:** the result of the last GPS acquisition attempt, either **fixacquired**, **fixnotacquired** or **N/A**.
- **GPS last known position:** the position of the last GPS acquisition attempt, either the latitude and longitude or **N/A**.

Instrument

- **Instrument XX last update:** date/time of the last status update the RBRcervello performed on the instrument **XX** or **N/A**.
- **Instrument XX:** the last known status of the instrument, either:
 - one of the natural statuses of an RBR instrument: **disabled**, **pending**, **logging**, **gated**, **stopped**, **finished**, **unknown**.
 - one of the natural statuses of an Aquadopp instrument: **stopped**, **logging**, **unknown**.
 - **commchannelerror:** the RBRcervello is unable to open the communication channel.
 - **loggererror:** the instrument has encountered an error.
 - **misconfigured:** the RBRcervello is unable to configure the instrument.
 - **notdiscovered:** the RBRcervello did not find the instrument.
 - **error**
 - **N/A**.
- **Instrument XX internal battery:** the last known internal battery of the instrument **XX** in Volts or **N/A**.
- **Instrument XX external battery:** the last known external battery of the instrument **XX** in Volts or **N/A**.

Download

- **Download remaining:** the total number of bytes remaining to be downloaded over all the instruments.



If the RBRcervello is misconfigured, only the general overview will be displayed.

7.2.1.6 Examples

```
1 RBRcervello> status
2
3 RBRcervello
```

```

4 Serial number: 208685
5 Part number: 0011493
6 Cervello firmware version: 1.16.0
7
8 Clock: 2021-10-29 02:24:35
9
10 Cervello status: disabled
11 Cervello internal battery: 13.68 V
12 Cervello external battery: 1.31 V
13
14 Storage used      : 168 MB
15 Storage remaining: 14355 MB
16 Storage size     : 15299 MB
17
18 Telemetry last update: 2021-10-29 02:00:09
19 Telemetry last result: success
20 Telemetry last mode  : rudics
21
22 GPS last update      : 2021-10-29 02:17:59
23 GPS last result      : fixacquired
24 GPS last known position: 45.349128 -75.917473
25
26 Instrument 01 last update      : 2021-10-29 02:24:06
27 Instrument 01                  : disabled
28 Instrument 01 internal battery: 5.11 V
29 Instrument 01 external battery: 0.00 V
30
31 Instrument 02 last update      : 2021-10-29 02:23:37
32 Instrument 02                  : stopped
33 Instrument 02 internal battery: 4.74 V
34 Instrument 02 external battery: 0.00 V
35
36 Instrument 03 last update      : 2021-10-29 02:20:45
37 Instrument 03                  : stopped
38 Instrument 03 internal battery: 4.69 V
39 Instrument 03 external battery: 0.00 V
40
41 Instrument 04 last update      : 2021-10-29 02:23:02
42 Instrument 04                  : stopped
43 Instrument 04 internal battery: 4.90 V
44 Instrument 04 external battery: 0.00 V
45
46 Download remaining: 0B

```

7.2.2 disable

7.2.2.1 Name

disable

7.2.2.2 Synopsis

Disable deployment.

7.2.2.3 Usage

disable [-h]

7.2.2.4 Options

-h, --help

Display this help message and exit.

-v, --version

Output version information and exit.

7.2.2.5 Description

Disable deployment, disable instruments, and generate a persistent flag to prevent reenabling instruments in future boot cycles.

7.2.2.6 Examples

```
1 RBRcervello> disable
2 Deployment disabled
```

7.2.3 diagnose

7.2.3.1 Name

diagnose

7.2.3.2 Synopsis

Perform in-depth tests for telemetry and MLM links

7.2.3.3 Usage

diagnose [-h|--help] | [-v|--version] [mlm|gsm|rudics]

7.2.3.4 Options

-h, --help

Display this help message and exit.

-v, --version

Output version information and exit.

mlm diagnose MLM telemetry

gsm diagnose GSM telemetry

rudics diagnose Iridium RUDICS telemetry

7.2.3.5 Description

mlm: Ensures correct HEM configuration and status. Discover all SSMs and configure them accordingly. Run various BER tests on the line.

gsm: Ensures connectivity through GSM to the Internet.

rudics: Ensures connectivity through Iridium RUDICS to the Internet.

7.2.3.6 Examples

```
1 RBRcervello> diagnose rudics
2 Stopping services...
3 Waiting for publisher to terminate...
4 Stopping periodic command scheduler: cron.
5 Starting RUDICS test
6 I think the RUDICS modem is on /dev/ttyS4 at 2400 baud.
7 Waiting for the modem to come up...
8 Teraform v1.1.2 (built 2021-10-27T13:30:04+0000)
9 2021-10-29 05:55:19 src/teraform.c:364 [INFO ]: Modem: "/dev/ttyS4"
10 2021-10-29 05:55:19 src/teraform.c:367 [INFO ]: Dial number: "0088160000500"
11 2021-10-29 05:55:19 src/teraform.c:388 [INFO ]: Configuring modem...
12 2021-10-29 05:55:19 src/teraform.c:432 [INFO ]: Waiting for modem to be
    available...
13 2021-10-29 05:55:19 src/teraform.c:451 [INFO ]: Checking IMEI...
14 2021-10-29 05:55:20 src/teraform.c:451 [INFO ]: IMEI: 300125061274520
15 2021-10-29 05:55:20 src/teraform.c:478 [INFO ]: Checking ICCID...
16 2021-10-29 05:55:20 src/teraform.c:478 [INFO ]: ICCID: 8988169763060305628
17 2021-10-29 05:55:20 src/teraform.c:488 [INFO ]: Disabling flow control...
18 2021-10-29 05:55:20 src/teraform.c:520 [INFO ]: Waiting for satellite signal...
19 2021-10-29 05:55:26 src/teraform.c:520 [INFO ]: Found signal of strength 5/5.
20 2021-10-29 05:55:26 src/teraform.c:530 [INFO ]: Configuring data connection...
21 2021-10-29 05:55:26 src/teraform.c:564 [INFO ]: Dialing data connection...
22 2021-10-29 05:55:34 src/teraform.c:564 [INFO ]: Connection dialed.
23 The modem connection is up.
24 Brought the rudics connection up successfully.
25 Teraform v1.1.2 (built 2021-10-27T13:30:04+0000)
26 2021-10-29 05:55:34 src/teraform.c:364 [INFO ]: Modem: "/dev/ttyS4"
27 2021-10-29 05:55:37 src/teraform.c:584 [INFO ]: Escaping from data call...
28 2021-10-29 05:55:38 src/teraform.c:594 [INFO ]: Disconnecting data call...
29 The serial link has been brought down.
30 Powering off the modem.
31 Starting periodic command scheduler: cron.
32 RBRcervello>
```

```
1 RBRcervello> diagnose gsm
2 Stopping services...
3 Waiting for publisher to terminate...
4 Stopping periodic command scheduler: cron.
5 Starting GSM test
6 I think the GSM modem is on /dev/ttyS4 at 230400 baud.
7 Waiting for the modem to come up...
8 Modem is up.
9 Waiting for PPP connection to the modem...
10 Established PPP connection to the modem. Modem identifiers:
11 IMEI: 867698040840616
12 IMSI: 302720511124309
13 ICCID: 89302720523086286725
14 Waiting for the modem to connect to the GSM network..
15 Reconnecting for Internet access (1/2)...
16     Bringing PPP connection down...
17     Bringing PPP connection back up...
18     Waiting for the PPP connection to become the default route
19 Making sure we can access the web...
20 The modem connection is up.
21 Brought the gsm connection up successfully.
```



```

22 /usr/local/wirewalker-
    controller/diagnostics/./publisher/modes/gsm/netpty/bin/netpty: error waiting for
    fds: Interruptl
23 messages-read: no process found
24 The serial link has been brought down.
25 Powering off the modem.
26 Starting periodic command scheduler: cron.
27 RBRcervello>

```

```

1 RBRcervello> diagnose mlm
2 Stopping services...
3 Waiting for publisher to terminate...
4 Stopping periodic command scheduler: cron.
5 Starting MLM test
6 I think the HEM is on /dev/ttyS3 at 115200 baud.
7 Trying to wake the HEM...
8 ***command mode***
9     RBR HEM-1000 1.300 208882
10 Found HEM 208882.
11 HEM firmware version 1.300 >= 1.300.
12     commands now locked
13 Checking HEM configuration...
14 Checking:     commands now unlocked
15     baud rate BAUD: 115200
16 Setting:     baud rate BAUD: 115200
17 Checking:     sleep timeout (10ms) ZTO: 1000
18 Setting:     sleep timeout (10ms) ZTO: 1000
19 Checking:     hardware flow control enable HWF: 0
20 Setting:     hardware flow control enable HWF: 0
21 Checking:     poll enable PEN: 0
22 Setting:     poll enable PEN: 0
23 Checking:     poll interval time (min) PINT: 5
24 Setting:     poll interval time (min) PINT: 5
25 Checking:     poll delay time (10ms) PDEL: 500
26 Setting:     poll delay time (10ms) PDEL: 500
27 Checking:     poll display enable PDISP: 0
28 Setting:     poll display enable PDISP: 0
29 Checking:     poll cmd string PCMD: x46,x30,x30
30 Setting:     poll cmd string PCMD: x46,x30,x30
31 Checking:     poll wakeup char enable PWUPEN: 1
32 Setting:     poll wakeup char enable PWUPEN: 1
33 Checking:     poll wakeup char PWUPCHAR: x0F
34 Setting:     poll wakeup char PWUPCHAR: x0F
35 Checking:     poll sleep enable (zzz) PSLPEN: 1
36 Setting:     poll sleep enable (zzz) PSLPEN: 1
37 Checking:     poll address PADD: 00
38 Setting:     poll address PADD: 00
39 Checking:     modem open channel timeout (10ms) MDOCDUR: 1000
40 Setting:     modem open channel timeout (10ms) MDOCDUR: 1000
41 Checking:     modem open channel permanent MDOCPERM: 0
42 Setting:     modem open channel permanent MDOCPERM: 0
43 Checking:     modem maximum retry count MDRTRY: 1
44 Setting:     modem maximum retry count MDRTRY: 1
45 Checking:     transparent max chars before send TPMXC: 256
46 Setting:     transparent max chars before send TPMXC: 256
47 Checking:     transparent send char TPSNDC: x0A
48 Setting:     transparent send char TPSNDC: x0A

```

```

49 Checking:      transparent send char enable TPSNDEN: 1
50 Setting:      transparent send char enable TPSNDEN: 1
51 Checking:      transparent send char as well enable TPSNDC2: 1
52 Setting:      transparent send char as well enable TPSNDC2: 1
53 Checking:      transparent char timeout (10ms) TPCTO: 20
54 Setting:      transparent char timeout (10ms) TPCTO: 20
55 Checking:      transparent char timeout enable TPCTOEN: 1
56 Setting:      transparent char timeout enable TPCTOEN: 1
57 Checking:      transparent escape timeout (10ms) TPESCTO: 75
58 Setting:      transparent escape timeout (10ms) TPESCTO: 75
59 Checking:      transparent escape timeout enable TPESCTOEN: 1
60 Setting:      transparent escape timeout enable TPESCTOEN: 1
61 Checking:      transparent request ack enable TPACK: 0
62 Setting:      transparent request ack enable TPACK: 0
63 Checking:      transparent display ack enable TPACKDSP: 0
64 Setting:      transparent display ack enable TPACKDSP: 0
65 Checking:      transparent display nak enable TPNAKDSP: 0
66 Setting:      transparent display nak enable TPNAKDSP: 0
67 Checking:      ber pattern BERPAT: RAND
68 Setting:      ber pattern BERPAT: RAND
69 Checking:      ber length (bytes) BERLEN: x0800
70 Setting:      ber length (bytes) BERLEN: x0800
71
72 Ensuring there is no open SSM channel before attempting any channel activity...
73     channel closed
74
75 Channel closed successfully.
76
77 Attempting SSM discovery:
78     discovery requested
79     208088
80 Found SSM 208088.
81     208090
82 Found SSM 208090.
83     discovery complete OK
84 Waiting for channel cooldown...
85 Opening a channel to the SSM...
86     channel requested (with ssm 208088)...GRANTED
87 .      RBR SSM-1000 1.300 208088
88 Opened channel to SSM 208088.
89 SSM firmware version 1.300 >= 1.300.
90 .      commands now unlocked
91 Checking SSM configuration...
92 Checking: .      baud rate BAUD: 19200
93 Setting: .      baud rate BAUD: 19200
94 Checking: .      sleep timeout (10ms) ZTO: 1000
95 Setting: .      sleep timeout (10ms) ZTO: 1000
96 Checking: .      RBR logger id retrieval enable LIDEN: 0
97 Setting: .      RBR logger id retrieval enable LIDEN: 0
98 Checking: .      transparent max chars before send TPMXC: 512
99 Setting: .      transparent max chars before send TPMXC: 512
100 Checking: .      transparent send char TPSNDC: x0A
101 Setting: .      transparent send char TPSNDC: x0A
102 Checking: .      transparent send char enable TPSNDEN: 0
103 Setting: .      transparent send char enable TPSNDEN: 0
104 Checking: .      transparent send char as well enable TPSNDC2: 1
105 Setting: .      transparent send char as well enable TPSNDC2: 1
106 Checking: .      transparent char timeout (10ms) TPCTO: 20

```

```

107 Setting: . transparent char timeout (10ms) TPCTO: 20
108 Checking: . transparent char timeout enable TPCTOEN: 1
109 Setting: . transparent char timeout enable TPCTOEN: 1
110 Checking: . transparent escape timeout (10ms) TPESCTO: 75
111 Setting: . transparent escape timeout (10ms) TPESCTO: 75
112 Checking: . transparent escape timeout enable TPESCTOEN: 1
113 Setting: . transparent escape timeout enable TPESCTOEN: 1
114 Checking: . transparent request ack enable TPACK: 0
115 Setting: . transparent request ack enable TPACK: 0
116 Checking: . transparent display ack enable TPACKDSP: 0
117 Setting: . transparent display ack enable TPACKDSP: 0
118 Checking: . transparent display nak enable TPNAKDSP: 0
119 Setting: . transparent display nak enable TPNAKDSP: 0
120 Checking: . ber pattern BERPAT: RAND
121 Setting: . ber pattern BERPAT: RAND
122 Checking: . ber length (bytes) BERLEN: x0800
123 Setting: . ber length (bytes) BERLEN: x0800
124 Performing a bit error test to assess loop quality...
125 (tx) sending ber msg...
126 .ber : x00000000 / 00004000
127 Bit error test passed.
128 . commands now locked
129 channel closed
130 Waiting for channel cooldown...
131 Opening a channel to the SSM...
132 channel requested (with ssm 208090)...GRANTED
133 . RBR SSM-1000 1.300 208090
134 Opened channel to SSM 208090.
135 SSM firmware version 1.300 >= 1.300.
136 . commands now unlocked
137 Checking SSM configuration...
138 Checking: . baud rate BAUD: 19200
139 Setting: . baud rate BAUD: 19200
140 Checking: . sleep timeout (10ms) ZTO: 1000
141 Setting: . sleep timeout (10ms) ZTO: 1000
142 Checking: . RBR logger id retrieval enable LIDEN: 0
143 Setting: . RBR logger id retrieval enable LIDEN: 0
144 Checking: . transparent max chars before send TPMXC: 512
145 Setting: . transparent max chars before send TPMXC: 512
146 Checking: . transparent send char TPSNDC: x0A
147 Setting: . transparent send char TPSNDC: x0A
148 Checking: . transparent send char enable TPSNDEN: 0
149 Setting: . transparent send char enable TPSNDEN: 0
150 Checking: . transparent send char as well enable TPSNDC2: 1
151 Setting: . transparent send char as well enable TPSNDC2: 1
152 Checking: . transparent char timeout (10ms) TPCTO: 20
153 Setting: . transparent char timeout (10ms) TPCTO: 20
154 Checking: . transparent char timeout enable TPCTOEN: 1
155 Setting: . transparent char timeout enable TPCTOEN: 1
156 Checking: . transparent escape timeout (10ms) TPESCTO: 75
157 Setting: . transparent escape timeout (10ms) TPESCTO: 75
158 Checking: . transparent escape timeout enable TPESCTOEN: 1
159 Setting: . transparent escape timeout enable TPESCTOEN: 1
160 Checking: . transparent request ack enable TPACK: 0
161 Setting: . transparent request ack enable TPACK: 0
162 Checking: . transparent display ack enable TPACKDSP: 0
163 Setting: . transparent display ack enable TPACKDSP: 0
164 Checking: . transparent display nak enable TPNAKDSP: 0

```

```

165 Setting: .      transparent display nak enable TPNAKDSP: 0
166 Checking: .      ber pattern BERPAT: RAND
167 Setting: .      ber pattern BERPAT: RAND
168 Checking: .      ber length (bytes) BERLEN: x0800
169 Setting: .      ber length (bytes) BERLEN: x0800
170 Performing a bit error test to assess loop quality...
171      (tx) sending ber msg...
172 .ber : x00000000 / 00004000
173 Bit error test passed.
174 .      commands now locked
175      channel closed
176 Waiting for channel cooldown... commands now locked
177 MLM communication looks good.
178 Starting periodic command scheduler: cron.
179 RBRcervello>

```

7.2.4 config-check

7.2.4.1 Name

config-check

7.2.4.2 Synopsis

RBR configuration checker.

7.2.4.3 Usage

config-check [-h|--help] | [-v|--version]

config-check [-c|--config-file] [device]

7.2.4.4 Options

-h, --help

Display this help message and exit.

-v, --version

Output version information and exit.

-c, --config-file [device]

Show configuration file.

Where "device" is the device of which configuration will be shown.

The supported devices are the following:

instrumentXX displays the corresponding deployment configuration of instrument **XX**.

cervello displays the user configuration of the RBRcervello.

7.2.4.5 Description

Display in an interactive manner the current configuration of the RBRcervello or one of the configured instruments. Use arrow keys to scroll the configuration. Key **Q** to exit.

7.2.4.6 Examples

```
1 RBRcervello> config-check -c cervello
2 Showing configuration file of cervello.
3 {
4   "file": {
5     "date": "20210814000000",
6     "version": "3.0.0",
7     "schema": "0011713",
8     "customer": "RBR"
9   },
10  "controller": {
11    "battery_period": 600,
12    "deep_sleep": {
13      "enabled": false,
14      "deep_sleep_duration": 3600
15    },
16    "clock_sync_timeout": 43200
17  },
18  "gps": {
19    "enabled": true,
20    "period": 600,
21    "fix_timeout": 60,
22    "hdop_threshold": 1.5
23  },
24  "telemetry": {
25    "enabled": true,
26    "force_period": 3600,
27    "mode": ["gsm", "rudics"],
28    "gsm": {
29      "failures_before_unavailable": 3,
30      "retry_period": 7200,
31      "apn": "auto",
32      "destination": "dataincoming.rbr-global.com:9140"
33    },
34    "rudics": {
35      "failures_before_unavailable": 3,
36      "retry_period": 7200,
37      "dial": "00881600005385"
38    }
39  }
40 }
41 }
```

7.2.5 edit-config

7.2.5.1 Name

edit-config

7.2.5.2 Synopsis

Edit the current configuration of an instrument or the RBRcervello.

7.2.5.3 Usage

`edit-config [-n|--new-file] | [-c|--config-file] device`

`edit-config [-h]`

7.2.5.4 Options

`-h, --help`

Display this help message and exit.

`-v, --version`

Output version information and exit.

`-c, --config-file [device]`

Where 'device' is the device of which configuration will be shown.

The supported devices are the following:

- **instrumentXX** allows editing the deployment configuration file of instrument **XX**
- **cervello** allows editing the RBRcervello user configuration file

`-n, --new-file`

Start editing from an empty file

7.2.5.5 Description

Edit interactively the configuration of a specific instrument or the RBRcervello configuration. This relies on the nano editor.

7.2.5.6 Examples

```
1 RBRcervello>edit-config -c instrument01
```

7.2.6 set-cervello-clock

7.2.6.1 Name

`set-cervello-clock` - sets internal clock.

7.2.6.2 Synopsis

RBRcervello clock setter.

7.2.6.3 Usage

`set-cervello-clock [string-formatted-date]`

`set-cervello-clock [-h]`

7.2.6.4 Options

`-h, --help`

Display this help message and exit.

-v, --version

Output version information and exit.

7.2.6.5 Description

Sets instrument clock and saves a previous and new time in every RSK file involved, the *RBRcervello*, and the instrument.



This command is intended to be used on units without a GPS, e.g. *RBRcervata*.

7.2.6.6 Examples

```
1 RBRcervello> set-cervello-clock '2014-12-25T12:34:56'
2 Previous internal time: '2014-12-25T10:12:00'
3 New internal time: '2014-12-25T12:34:56'
```

7.2.7 cervello-clock

7.2.7.1 Name

cervello-clock

7.2.7.2 Synopsis

RBRcervello clock checker

7.2.7.3 Usage

cervello-clock [-h|--help]

7.2.7.4 Options

-h, --help

Display this help message and exit.

-v, --version

Output version information and exit.

7.2.7.5 Description

Display the current clock of the *RBRcervello* and its last manually triggered clock synchronization.

- **Last time sync:** last manually triggered clock synchronization date/time. This does not reflect GPS clock resynchronization time.
- **Current internal time:** current clock of the *RBRcervello*.

7.2.7.6 Examples

```
1 RBRcervello> cervello-clock
2 Last time sync: '2021-06-28 15:31:00'
3 Current internal time: '2021-06-29 11:54:24'
```


7.2.8 reboot-controller

7.2.8.1 Name

reboot-controller - gracefully reboot the system.

7.2.8.2 Synopsis

Reboot system as if it had entered deep sleep and waken up.

7.2.8.3 Usage

reboot-controller [-h]

7.2.8.4 Options

-h, --help

Display this help message and exit.

-v, --version

Output version information and exit.

7.2.8.5 Description

Stop all internal services and reboot the *RBRcervello*. Useful for testing deployment behaviour.

7.2.8.6 Examples

```
1 RBRcervello> reboot-controller
2 ...
3 The system is going down for reboot NOW!
4 ...
```

7.2.9 scrub-controller

7.2.9.1 Name

scrub-controller - clears the system's storage.

7.2.9.2 Synopsis

Clear all data stored in the *RBRcervello* storage.

7.2.9.3 Usage

scrub-controller [-h] | [-f|--format]

7.2.9.4 Options

-h, --help

Display this help message and exit.

-v, --version

Output version information and exit.

-f|--format

(Not available for RBRcervata)

Formats the SD card in the proper ext4 filesystem and initializes the folder structure.

7.2.9.5 Description

Clear all data stored in the RBRcervello storage. This command is unavailable if the RBRcervello status is logging.

7.2.9.6 Examples

```
1 RBRcervello> scrub-controller
2 Are you sure you want to scrub the controller? (y/N)y
3
4 Removing files from
5   /mnt/sdcard/data...
6   /mnt/sdcard/logs...
7   /mnt/sdcard/lost+found...
8   /mnt/sdcard/messages...
9   /mnt/sdcard/publisher...
10  /mnt/sdcard/queues...
11  /mnt/sdcard/responses...
12  /mnt/sdcard/tasks...
```

7.2.10 scrub-instrument

7.2.10.1 Name

scrub-instrument - memory eraser for instruments

7.2.10.2 Synopsis

RBR instrument scrubber.

7.2.10.3 Usage

scrub-instrument [-h|--help] | [-v|--version]

scrub-instrument [-a|--all]

scrub-instrument [instrumentXX]

7.2.10.4 Options

-h, --help

Display this help message and exit.

-v, --version

Output version information and exit.

instrumentXX

Erase instrument XX.

-a

Erase all instruments.

7.2.10.5 Description

Clear the internal memory of an instrument connected to the system. This command is unavailable if the *RBRcervello* status is logging.

7.2.10.6 Examples

```
1 RBRcervello> scrub-instrument instrument01
2 Are you sure you want to scrub instrument01? (y/N) y
3 Checking deployment status...
4 Clearing memory...
5 Instrument 01: success
```

```
1 RBRcervello> scrub-instrument -a
2 Are you sure you want to scrub ALL instruments? (y/N) y
3 Checking deployment status...
4 Clearing memory...
5 Instrument 01: success
6 Instrument 02: success
```

7.2.11 enable

7.2.11.1 Name

enable

7.2.11.2 Synopsis

Enable deployment according to internal configuration files.

7.2.11.3 Usage

enable [-h]

7.2.11.4 Options

-h, --help

Display this help message and exit.

-v, --version

Output version information and exit.

7.2.11.5 Description

Enable deployment, configure instruments, and enable them to start logging. Deletes any stopping flag for the deployment, whenever the system reboots, the deployment behaviour will continue.

7.2.11.6 Examples

```
1 RBRcervello> enable
2 Deployment enabled
```

7.2.12 help

7.2.12.1 Name

help

7.2.12.2 Synopsis

Display the RBRcervello diagnostic menu help.

7.2.12.3 Usage

help

7.2.12.4 Options

-h, --help

Description

Displays the RBRcervello diagnostic menu help as shown on wake up.

7.2.12.5 Examples

```
1 RBRcervello> help
2 RBRcervello Menu.
3
4 These are the available commands to manage RBRcervello
5   disable          Stop deployment.
6   status           Provide a general overview or detailed information on
7                   controller and instruments.
8   diagnose         Diagnostics for MLM and telemetry.
9   config-check      Print the current configuration of a specific RBR
10                  subsystem.
11   edit-config       Edit the current configuration of a specific
12                  RBR subsystem.
13   set-instrument-clock RBR instrument clock sync.
14   set-cervello-clock  RBRcervello clock setter.
15   cervello-clock     RBRcervello clock checker.
16   scrub-controller   Clear all data stored in the SD card.
17   scrub-instrument   RBR instrument scrubber.
18   enable            Start deployment according to internal configuration
19                  files.
20   reboot-controller  Reboot system as if it had entered deep-sleep and
21                  waken up.
22   help              Show this menu.
```

8 Repairs

RBR supports all our products. Contact us immediately at support@rbr-global.com or via the [RBR website](#) if there are any issues with your instrument. Please have the model and the serial number of the unit ready. Our support team will work to resolve the issue remotely. In some cases, you may have to return your instrument to RBR for further servicing.



There are no user-repairable parts of the instrument. Any attempt to repair without prior authorisation from RBR will void the warranty. Refer to the [RBR warranty statement](#).

To return a product to RBR for an upgrade, repair, or calibration, please contact our [support team](#) to obtain a return merchandise authorisation code (RMA) and review the detailed shipping information on the [RBR website](#).