Sonic 2024/2022
Quick Start

R2Sonic, LLC

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PIONEERS OF WIDEBAND, HIGH RESOLUTON, MULITBEAM SYSTEMS

This Quick Start is designed as a short 'How-To' that will allow the user to rapidly set up the Sonic 2024/2022 multibeam echosounder. The user should refer to the Sonic 2024/2022 Operation Manual for more extensive and in-depth coverage of the setup and operation of the Sonic 2024/2022.

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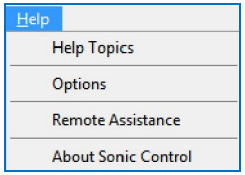
Table of Contents

I. Mounting the Sonic 2024/2022 7
II. Mounting the Sonar Interface Module 9
III. Installing Sonic Control 2000 11
IV. Sonic 2024/2022 Orientation and Acoustic Centre 13
V. SIM Interfacing 17
A. Network Setup 17
B. Sensor Settings 19
VI. Sonic 2024/2022 Operation 21
A. Sonar Setup 21
B. GateTrac™ 23
C. Operational Settings 24
1. RangeTrac™ 24
2. Power 24
3. Pulse Width 25
4. Gain 25
6. Gate Min and Gate Max 25
7. Brightness 25
8. Gate Slope 25
D. Ocean Settings 26
1. Absorption 0 – 200 dB/km 26
2. Spreading Loss 26
3. Sound Velocity 27
VII. Sonic Control 2000 Display Settings 29
VIII. Status 30
IX. Help Menu 31

IX. Help Menu

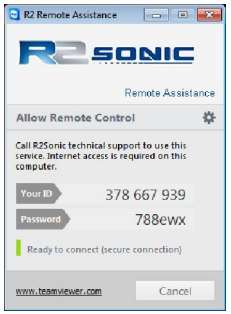


1. Help Topics: brings up the electronic copy of the Sonic Operation Manual

2. Options: shows the upgrades that have been installed on this particular sonar. The installed options are enabled, or disabled, in Sonar settings

3. Remote Assistance: allows R2Sonic Support to take control of the user's computer to assist in setup or for troubleshooting the system. Remote Assistance will bring up a separate program: TeamViewer™. The computer must be attached to the internet.

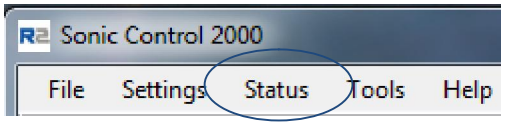
   The Remote Assistance will provide an ID number and Password; both need to be provided to R2Support@R2Sonic.com, or call +1.805.259.8142.

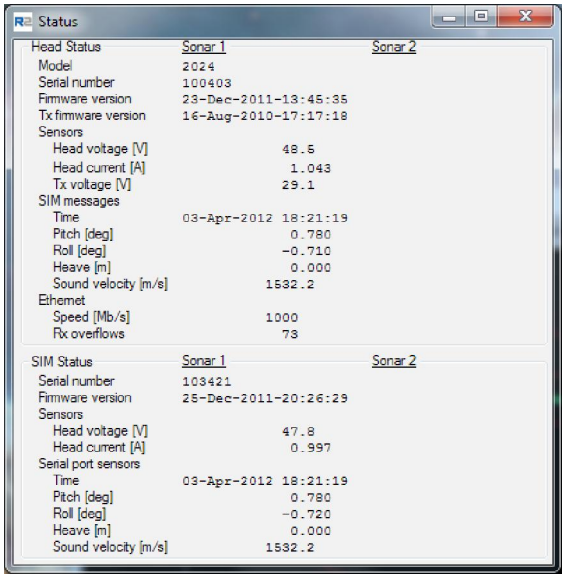


4. About Sonic Control: shows the version of Sonic Control that is being used

VIII. Status

Select Status, to view the both the head and SIM information, including installed firmware version and SIM serial communications.

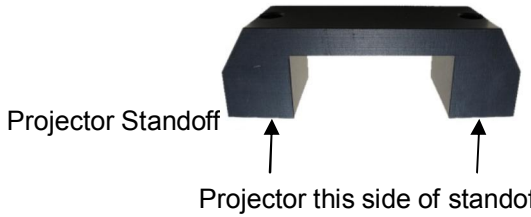




I. Mounting the Sonic 2024/2022

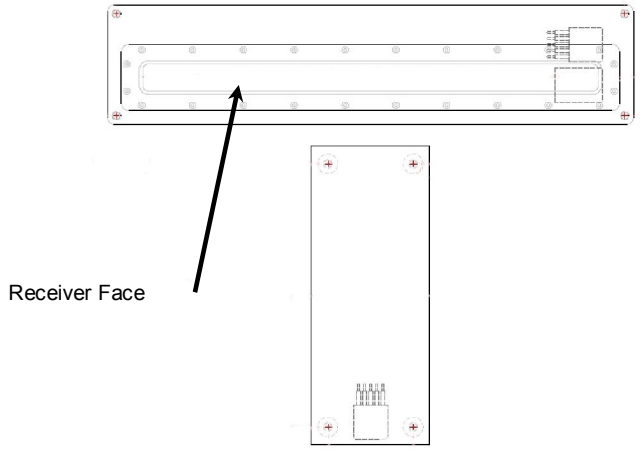
The Sonic 2024/2022 sonar head is comprised of the receive module, the projector and associated cables. The sonar head is mounted on the Sonic 2024/2022 mounting frame. The mounting frame is attached to the hydrophone pole via a 9 inch flange. The deck cable, from the Receive Module, runs through the flange and up through the pole to the Sonar Interface Module (SIM) as does the sound velocity probe interface cable.

1. Thread the deck lead through the flange and secure to the receive module
2. Thread the sound velocity cable through the flange and then through the opening on the side where the sound velocity probe mount is located
3. Connect the 0.439m interconnect cable to the receiver, but not to the projector at this time
4. Secure both the projector interconnect and the deck lead to the ear on top of the receive module with cable ties
5. Mount the receive module so that the narrow part of the receiver's titanium face is towards the projector.
6. Wrap thread with Teflon™ pipe thread tape to prevent galling before putting on washers and nuts
7. Do not over torque the nuts on the receiver's bolts. Do not tighten beyond 17Newton metre (150 pound-inch or 12.5 pound-foot).
8. Connect the 0.439m interconnect cable to the projector
9. Mount the projector, with the connector towards the protective fin end of the mount
    a. The projector has two 35mm stand-offs to elevate the projector away from the mounting frame so the interconnect cable can be passed under the projector



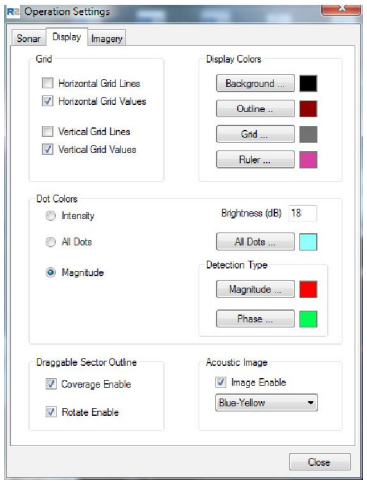
b. Pass the bolts through the mounting frame, then place a stand-off over the bolt before mounting the projector

10. Ensure the interconnect cable is between the standoffs
11. Connect and mount the sound velocity probe in the holder on the mounting frame.



PROJECTOR FACES FORWARD, TOWARDS THE BOW

VII. Sonic Control 2000 Display Settings



1. Sonic Control's appearance can be modified using the Display tab, under Operation Settings.

2. Dot Colors provides information, which can be used to obtain more information on the system operation.

   a. Intensity provides a grey scale representation of the reflect acoustic energy

   b. Magnitude provides a dot colour that is coded based on the type of bottom detection that was performed.

3. Sector Handles section allows the user to enable or disable the function of using the mouse cursor to change opening angle or rotate the swath.

4. Acoustic Image user can turn the GUI's acoustic imagery on and off and also select the desired palette

II. Mounting the Sonar Interface Module

The Sonar Interface Module (SIM) provides power to the sonar head; sends all commands and data to the sonar head; receives the bathymetry and imagery data from the sonar head and sends it to Sonic Control 2000 and the data collection computer. The SIM is interfaced to: the GPS (time message), the sound velocity probe at the head, and the motion sensor (for roll stabilisation) and also a PPS source.

1. The deck lead is 15 metres in length, so the SIM must be placed within 15 metres of the sonar head (optional lengths up to 50m can be provided at extra cost)
2. The SIM is not water proof so must be placed in a dry location with proper climate control
3. The SIM can be mounted either horizontally or vertically
4. Remove the two plastic corner trim pieces to expose the mounting holes
5. Secure the SIM using #8-32 pan head, M4 pan head or M5 socket head cap screws.

20 – 30 is normally sufficient for most survey conditions. When in deeper water the Spreading Loss will have to be increased.

When operating in very shallow water, fix gain may provide better quality data (depends on water and bottom conditions). Fixed gain is applied when the Absorption and Spreading Loss are set to 0.

3. Sound Velocity

The Sonic 2024 and 2022 require the sound velocity, at the sonar head, for the receive beam steering. If the sound velocity, from the probe, is erratic or has stopped, a manual sound velocity can be entered in emergency to complete the survey line. A manually entered sound velocity should never be used in place of the correct velocity, from the probe, on the head.

D. Ocean Settings

The Sonic 2024 uses Time Variable Gain (TVG), where receive gain will increase, during the receive cycle, to reflect the Absorption and Spreading loss characteristics of the water. The TVG parameters are set under Settings | Ocean settings.

1. Absorption 0 – 200 dB/km

Absorption represents the conversion of acoustic energy to heat as the acoustic pulse strikes dissolved salts in the water. Absorption is very dependent on Operating Frequency, salinity and temperature. Changing the Operating Frequency will require a change in the Absorption value.

Seawater Absorption db/km					
Freq.	**10°C**	**15°C**	**20°C**	**25°C**	**30°C**
200	55	67	80	89	92
210	57	69	82	94	98
220	59	71	85	97	104
230	61	74	88	101	109
240	63	76	91	105	115
250	65	78	94	109	120
260	67	80	96	113	125
270	69	82	99	116	130
280	71	84	101	120	134
290	73	86	104	123	139
300	75	88	106	126	143
310	78	91	108	129	148
320	80	93	111	132	152
330	82	95	113	135	156
340	85	97	115	138	160
350	87	99	118	141	164
360	90	102	120	143	168
370	92	104	122	146	171
380	95	106	125	149	175
390	98	109	127	152	179
400	100	111	129	154	182

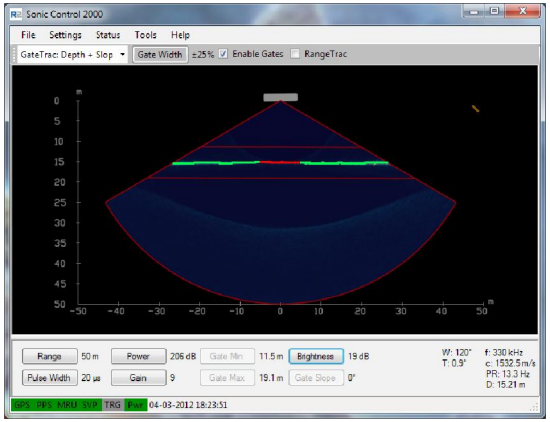
2. Spreading Loss

Spreading loss is the loss of intensity of a sound wave, due to dispersion of the wave front. Spreading loss is not a setting that normally needs to be changed except when surveying in deeper depths. As spreading loss is not dependent on frequency, the setting is unaffected by a change in operating frequency. A value of

III. Installing Sonic Control 2000

Sonic Control 2000 is the user interface to the Sonic 2024/2022. Sonic Control 2000 is used to set up the SIM and send operational commands, via the SIM, to the Sonic 2024. Sonic Control 2000 provides a visual means to assess the Sonic 2024/2022 multibeam data. Turn off all firewalls to ensure communication. Sonic Control requires that the latest Windows .NET framework is installed (dotNetFx40 can be downloaded from the Microsoft web site).

1. Sonic Control 2000 can be placed on the data collection computer or a stand alone computer
2. Create a folder, in the root directory, for Sonic Control 2000. Do not put under Windows Program Files or place all of the files on the desktop
3. The Sonic Control 2000 files are placed in the folder in the root directory
4. A desk top shortcut to R2SONIC.exe is created, from which the program is run
5. Sonic Control 2000 is shown below. The lower panel contains all of the operational parameters that control the Sonic 2024.



3. Pulse Width

Pulse width determines the length of time each acoustic pulse is transmitted. The range is from 15 – 1000 µSec. Maintain as short a pulse width as possible to optimise the resolution (20µSec - 40µSec), but not so short as to weaken the transmit pulse. The lower the operating frequency the longer the transmit pulse length needs to be, so changing frequency means the user may have to change the pulse length. Surveying into deeper waters will require an increase in pulse length to get more total power into the water.

4. Gain

Gain sets the receive gain or degree of amplification. The Gain needs to be balanced with the Power setting. Too high or too low gain will result in noisy data. It is generally better to use the Power to increase the strength of the bottom returns rather than increasing the gain to receive weaker returns.

6. Gate Min and Gate Max

These buttons are used to set the minimum and maximum depth for the gates. The buttons are only enabled when Gates Manual is used, in the GateTrac mode, these buttons are disabled.

7. Brightness

Increases or decreases the wedge's acoustic imagery.

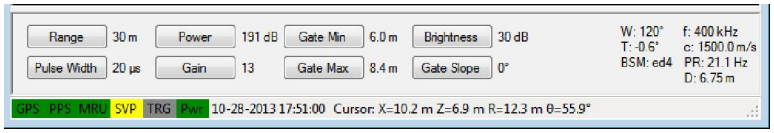
8. Gate Slope

Sets the desired tilt of the gates when GateTrac: Depth or Gates Manual is used. When GateTrac: Depth + Slope is enabled, this button is disabled.

C. Operational Settings

Operational Commands include setting the Range (slant range), Power (source level), Gain (receiver amplification), and Pulse Width.

All Operational Commands are changed by placing the mouse cursor over the command button and using the right mouse button to increase the value and the left mouse button to decrease the value. Holding down the mouse button will enable the settings to continuously change, either up or down



1. RangeTrac™

Range sets the maximum slant range for the depth water. This is easy to set by looking at the sonar wedge and setting the Range so that all bottom detections are within the straight legs of the wedge. **RangeTrac™** automatically will set the correct range and optimise the ping rate for the water depth. RangeTrac is enabled by selecting the box next to RangeTrac

When RangeTrac is enabled, the Range button will change appearance: = Range = RangeTrac will stay enabled until the Range is manually changed, or RangeTrac is de-selected.

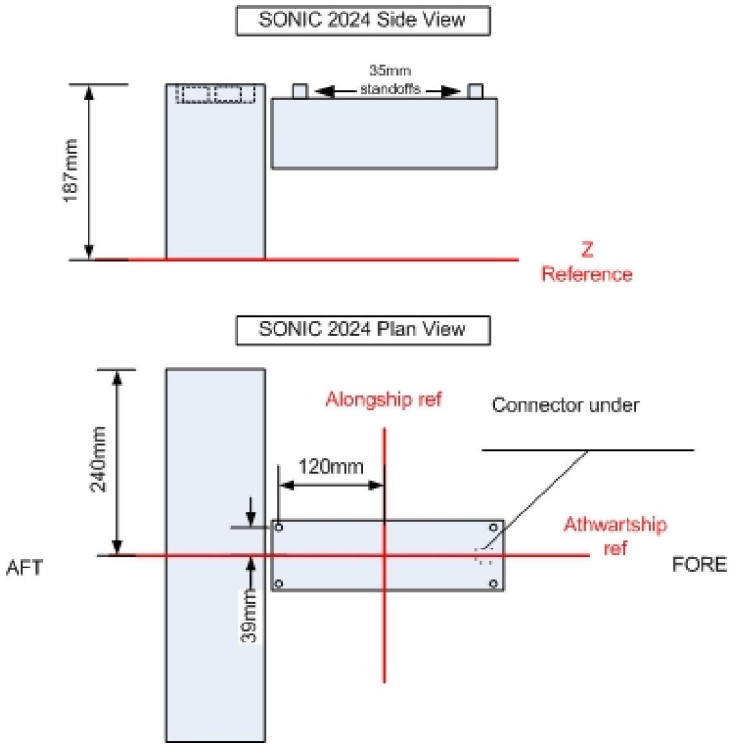
2. Power

Power is the source level of the Projector. The settings are from 191 – 221 dB. The Power should be set high enough to ensure strong bottom returns. In shallow water, it is important not to have Power set too high; otherwise, the bottom returns will be too strong and over-drive the receivers. Shift-left click will set Power 0 (off).

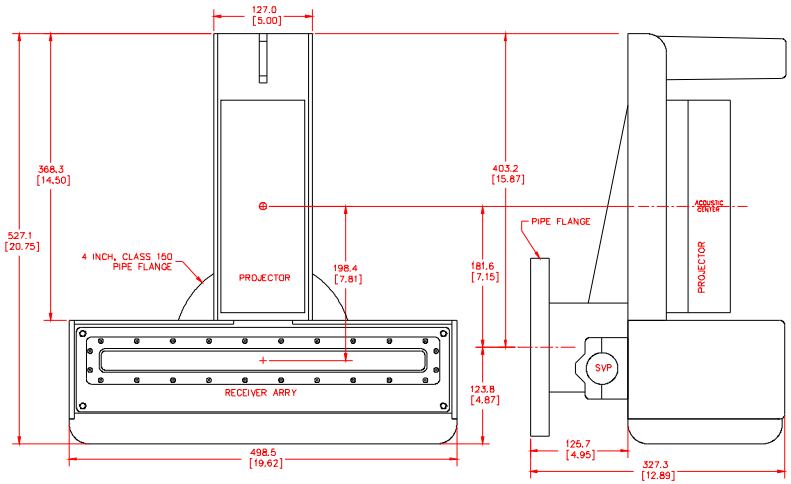
IV. Sonic 2024/2022 Orientation and Acoustic Centre

The Sonic 2024/2022 sonar head is installed with the projector facing forward. The projector orientation can be changed, in Sonic Control's Installation settings, if the projector must face aft.

The Sonic 2024/2022 acoustic centre is that location where all sonar head offsets are measured to. The acoustic centre is that location for which the multibeam data is referenced in three dimensions.



Sonic 2024 Acoustic Centre

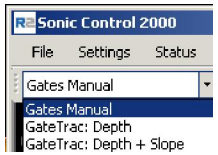


Offsets when the Sonic 2024 is mounted on the mounting frame

Centre of flange to Alongship offset = 0.182metres (0.597ft)
Top of flange to Z reference = 0.327metres (1.073ft)

B. GateTrac™

1. Depth Gates allow the user to exclude returns, from the bottom detection process, based on a minimum and maximum depth. The gates are turned on and off by the drop down selection in the upper left hand area of the window. Along with manual gates, R2Sonic offers automatic gating through **GateTrac™.** There are two GateTrac options: GateTrac: Depth and GateTrac: Depth Slope. Gates are enabled or disabled, by the selection box, next to the drop down.

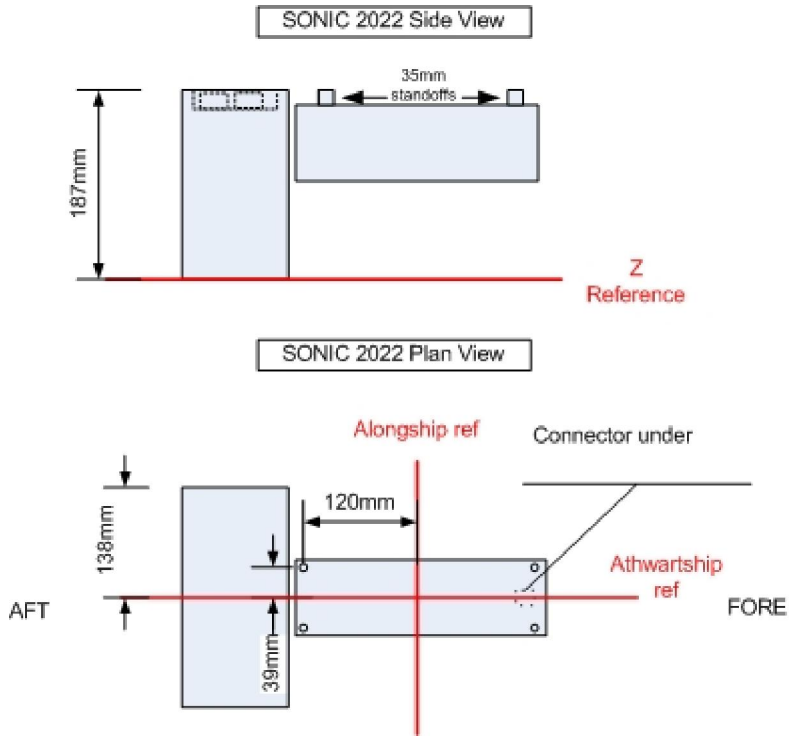


With Gates Manual, the depth gates are controlled by the mouse or the Gate Min and Gate Max buttons. The slope of the manual gates can be adjusted by the Slope button. Use the right mouse button to move both Min and Max gate limits simultaneously.

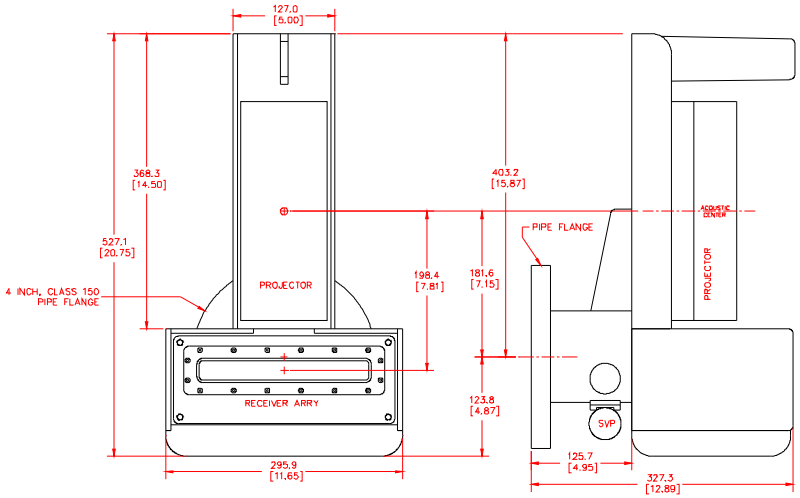
c. **GateTrac: Depth**: The Min and Max gate limits will adjust automatically, based on the depth percent tolerance entered; slope can still be set manually
d. **GateTrac: Depth + Slope**: The Min, Max and Slope will all be set automatically. The Min and Max gate limits are set by the depth percent tolerance entered

2. The Depth Gates will block all data less than and greater than the depths set. These data will not be passed on to the data collection computer

4. The selected sector can be rotated, port or starboard, to direct the sector at a feature of interest. The mouse can also be used to rotate the sector by positioning the cursor along the bottom of the wedge; the cursor will change to horizontal double arrow and can now be rotated by click and drag.
5. A minimum range gate can be enabled to keep noise away from the sonar head. Do not use this gate if working in very shallow water.
6. Either Equiangular or Equidistant sampling can be selected in the Bottom Sampling selection. Further, the Dual/Quad mode can be used to spatially distribute the bottom detections (please refer to the Operation Manual for full details of this mode of operation).
7. Mission Mode is another unique feature of the Sonic family of multibeam sonars.
   - Down Bathy Norm – Normal bathymetry survey
   - Down Bathy VFeature – Optimised operation for mapping of vertical surfaces
   - Down Bathy Off is for imagery only and will not output bathymetry
   - Up Bathy Norm, Up Bathy VFeature and Up Bathy off are specialised for forward looking and hull inspections.
8. Roll Stabilize will adjust the relative angle of the beams for the roll of the vessel.
9. If using two Sonic multibeams, select the desired Dual Head Mode: Simultaneous Ping or Alternating Ping.
10. Installed, upgrade features, can be turned on or off, by selecting the corresponding box next to:
    - TruePix™ Enable
    - Snippets Enable
    - Water Column Enable
    - Intensity Enable is standard for all systems and not an upgrade. Intensity Enable outputs an intensity value of bottom detection



Sonic 2022 Acoustic Centre

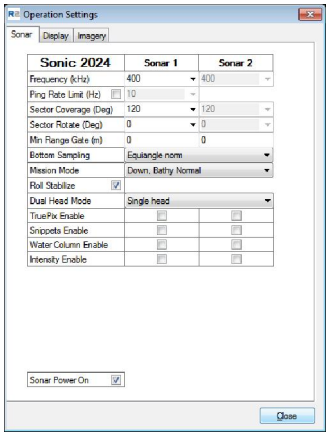


Offsets when the Sonic 2022 is mounted on the mounting frame

Centre of flange to Alongship offset = 0.182metres (0.597ft)
Top of flange to Z reference = 0.327metres (1.073ft)

VI. Sonic 2024/2022 Operation

All operational commands and parameters are set in **Sonic Control 2000**. The information is sent, via Ethernet, to the SIM where it is then sent to the Receive Module. All beam forming, bottom detection and processing operations are done in the Sonic 2024/2022 Receive Module.



Operation Settings

- Set operation frequency.
- Set sector coverage
- Set sector rotation
- Set equidistant or equiangular and dual/quad mode
- Set Mission Mode
- Can reduce ping rate
- Turn roll stabilisation on or off
- Turn power off in the sonar head

A. Sonar Setup

1. The Sonic 2024/2022 operates over a user selectable frequency range from 200 – 400 kHz in 10 kHz steps (UHR option operates at 700 kHz).
2. The Sonic 2024/2022 will transmit an acoustic pulse (ping) at a rate that is controlled by the Range setting. In shallow water this rate may be higher than desired; the user can select to reduce the Ping rate, from the default, by deselecting Default Ping Rate and entering the desired lower ping rate.
3. The user can select the swath coverage angle by entering the desired Sector Coverage. All 256 beams will fill the sector from 160° to 10°. The mouse can also be used to set the Sector Coverage. Place the cursor on one of the legs of the wedge; the cursor will change to a double arrow. Click and drag the side of the wedge to change the sector coverage. For general survey, it is recommended not to exceed an opening angle of 130°.

V. SIM Interfacing

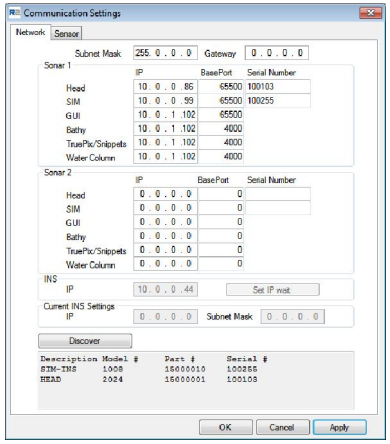
The deck lead, from the sonar head, is connected to the SIM. The SIM has 4 clearly labelled (on top of the SIM) DB9 male connections for RS-232 communication (set up of the ports is through Sonic Control 2000). Each DB9 is unique for the data to be interfaced. The SIM receives data on Pin 2 of the DB9; Pin 5 is the common.

1. Connect the PPS, from the GPS receiver to the BNC connector labelled PPS
2. Connect the GPS, sound velocity probe and motion sensor to the appropriate DB9 connections
3. Connect an Ethernet cable from the Data RJ45 connection to the computer that has Sonic Control 2000 installed

A. Network Setup

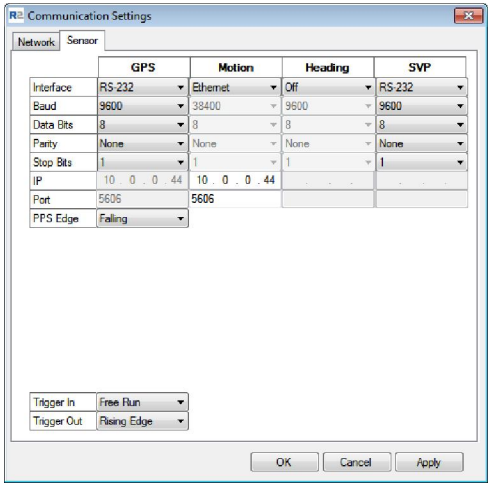
1. For initial communication, configure the computer's IP for 10.0.1.102; Subnet Mask: 255.0.0.0. After communication is established, the Ethernet properties can be changed.
2. In Sonic Control, go to Settings | Network Settings.
3. The correct serial numbers (Sonar Head and SIM) need to be entered to establish communication. Use the Discover feature, which will return the serial numbers of all attached

R2Sonic equipment and will automatically enter the correct serial numbers in the appropriate area.



4. After the serial numbers for the sonar head and SIM are entered (and Applied), the screen will show dots.
5. Once default communication is established, the networking can be changed to the user's preference.
6. The networking parameters are stored in the current settings ini file.
7. The INS area is for the R2Sonic I2NS enabled systems and is covered in the I2NS Quick Start, so is not covered here.

B. Sensor Settings



1. Setup the GPS (ZDA or UTC), Motion and SVP in Sensor Settings.
2. When setting up the GPS, make sure to correctly set the PPS Edge (see the GPS manufacturer's manual for pulse synch edge).
3. The Ethernet input for GPS is not currently enabled for non-I2NS systems.
4. Motion data can be the standard TSS1 format on serial or the iXSea TAH ($PHOCT) on either serial or Ethernet. The update rate, for motion, should be set for the highest possible baud rate and update rate; a minimum of 100 Hz is preferred.
5. The SIM serial port upper LED will be either: green – receiving data; red – no connection; orange – data present, but parameters are not correct or, if it is the head LED indicator (next to the On/Off switch), the head current draw is below expected limits.
    a. The lower, left, portion of the GUI replicates the LED colours
    b. The Status message is useful when setting up the serial interfacing