Seafloor™ Hydrote Plus Dual Frequency™

Single Beam Sonar

Table of Contents

Introduction

Overview

The HydroLite Plus Dual Frequency system is a hydrographic grade echosounder kit. This system's rugged design and flexibility address the need for general land survey applications and more detailed hydrographic surveys. The system has the ability to integrate with traditional land survey data collectors and software to generate generic bottom track elevation data. It can also output high quality echogram data into dedicated collection software to post process the bottom track more accurately.

Components

Components

*GPS & data collector not included

HydroLite Plus topside

HydroLite Plus Dual Frequency transducer

Charger

Data cable

RS232 – USB adapter

3x Poles

Transom mount

4mm allen driver

Null modem

Gender changer

Warranty Information

Seafloor Systems, Inc. makes every effort to assure its products meet the highest quality, reliability and durability standards and warrants to the original purchaser or purchasing agency that each HydroLite Plus be free from defects in materials or workmanship for a period of one year from date of shipment.

Warranty does not apply to defects of misuse, negligence or accidents. Warranty also does not cover repairs or alterations outside of our facilities, or use of the HydroLite Plus for purposes other than water measurements. Seafloor is not responsible for loss of instruments, damage to property, or injury/death associated with the use of any of its products or 3rd party products that may be included or used with Seafloor products. Seafloor does not warranty third-party products sold by Seafloor. These may include GPS, depth sounders and other ancillary equipment. All warranty services are FOB Seafloor's facility in Shingle Springs, California, U.S.A.

Assembly

To assemble the HydroLite Plus, attach the transducer to one of the provided survey poles. Loosen the locking nut on the Transom Mount and slide the pole through both holes, tighten the locking nut when in the desired position. When mounting on the side of a vessel, ensure that the pole is as close to vertical as possible. Additional 2ft pole sections can be threaded on.

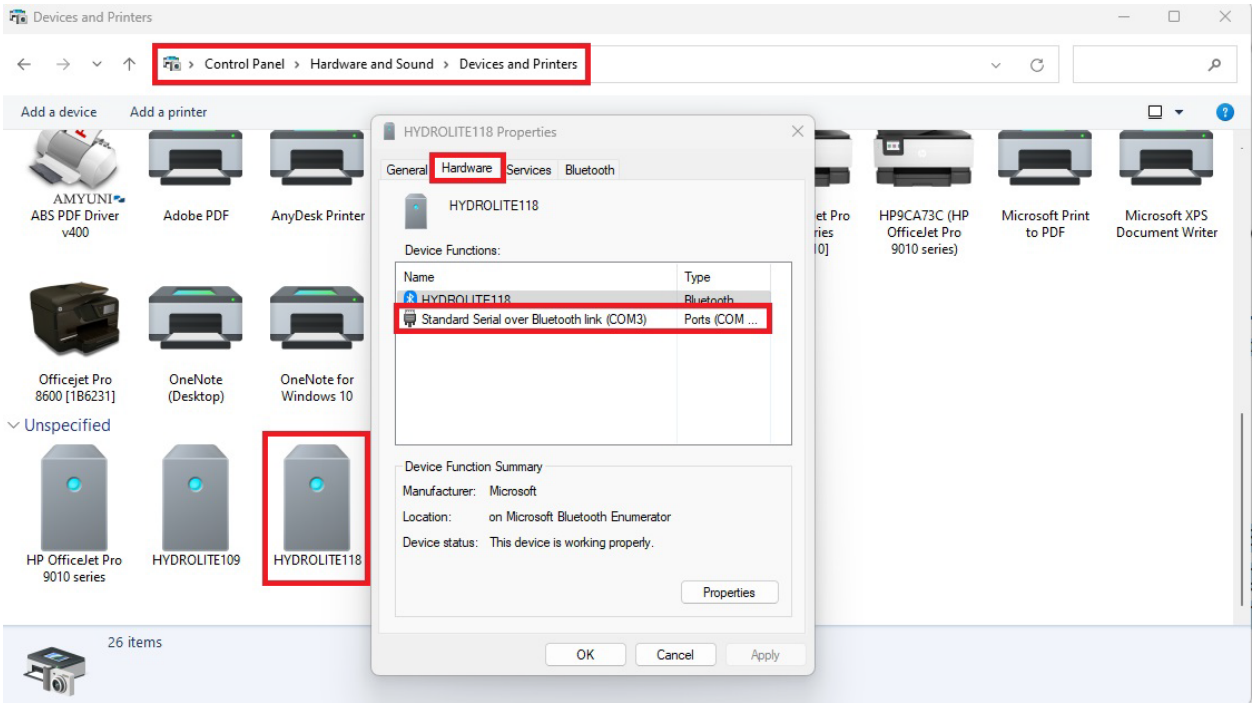
Attach the HydroLite Plus topside to the pole using the included allen driver and plug in the transducer cable. To the "Sonar/Charger" port. The included MilSpec-RS-232 cable attaches to the RS-232 port. Note – When this is plugged in, the Bluetooth output is disabled.

Connection – Windows Device

Power on the HydroLite Plus by pushing the button the front face of the unit. This system is capable of connection over either Bluetooth or hardwire connection.

Bluetooth – Connection and Com Port

1. Open Settings in Windows 10-11
2. Select Bluetooth and Devices
3. Add Device
    a. Device ID: HYDROLITE###
    b. Password: SEAFLOOR
4. Open Control Panel > Hardware and Sound > Devices and Printers (Win 11 when in Hardware and Sound, right click Devices and printers and select Open in New Window)
5. Scroll to the bottom where the "Unspecified" devices are. Double Click the HydroLite and navigate to the Hardware Tab. From there, Note the COM number assigned to the Device. See figure on the next page.

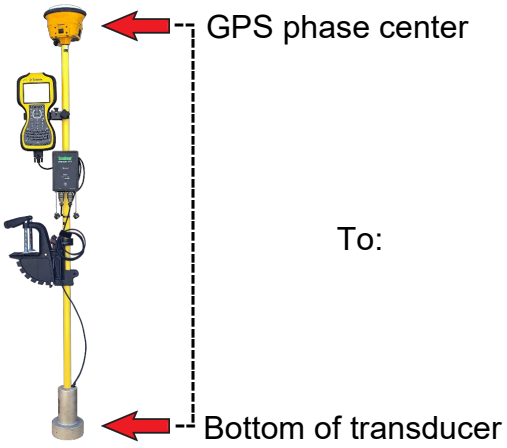


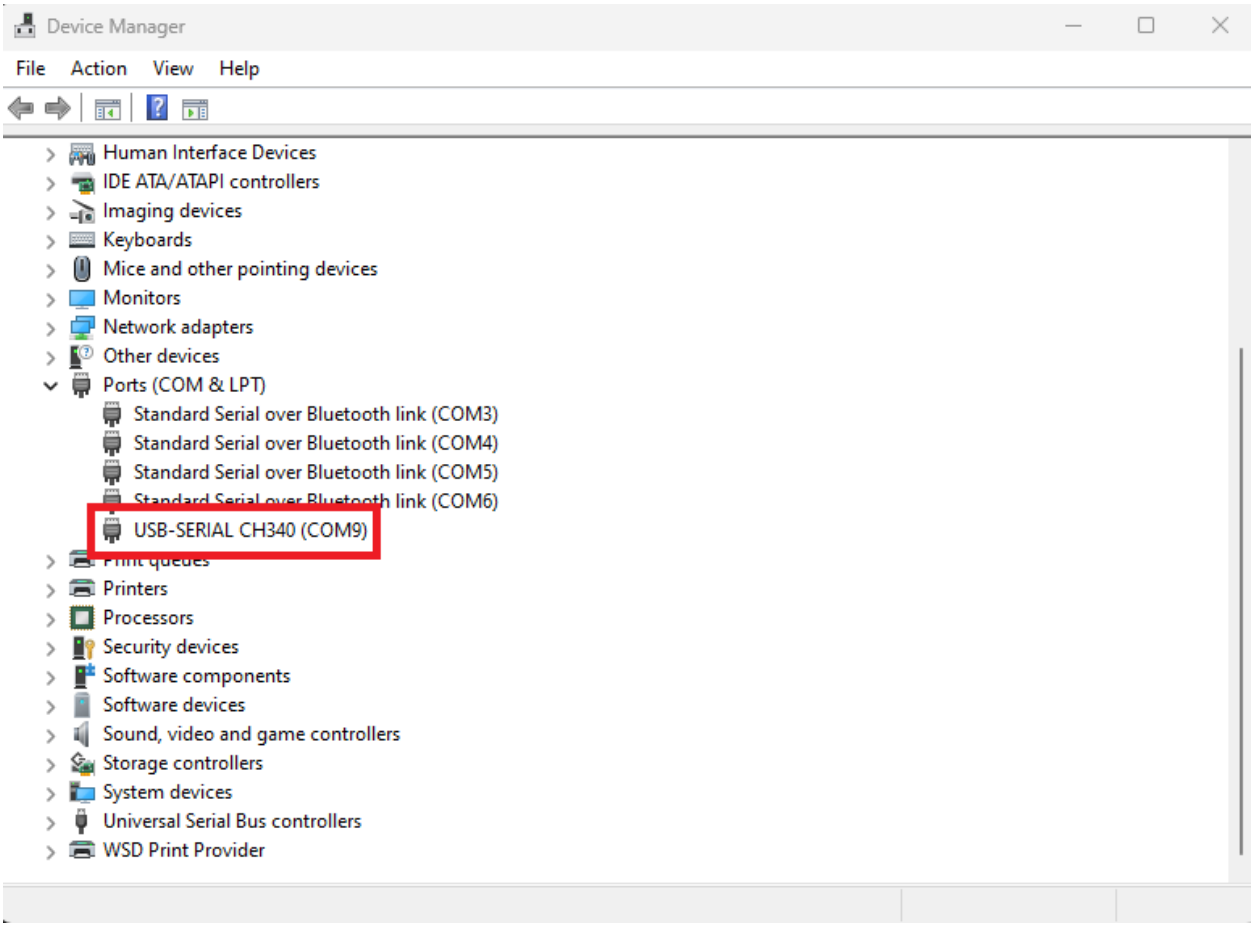
Hardwire – Connection and Com Port

1. Connect the Milspec-RS232 cable to the Sonar Port on the HydroLite Plus Topside.
2. Connect the system to the RS232-USB adapter supplied with the system.
3. Open Device manager and select the dropdown for Ports (COM & LPT)
4. Plug in the USB Adapter and it should automatically download and install the correct driver for the device. A new port should appear with a COM number assigned to it. (If it doesn't, Look under Other devices and see if the adapter is under that category. The driver needed for this adapter is called CH340. See image on next page.

Offset

Enter rod height from:





Device Settings

Control Program

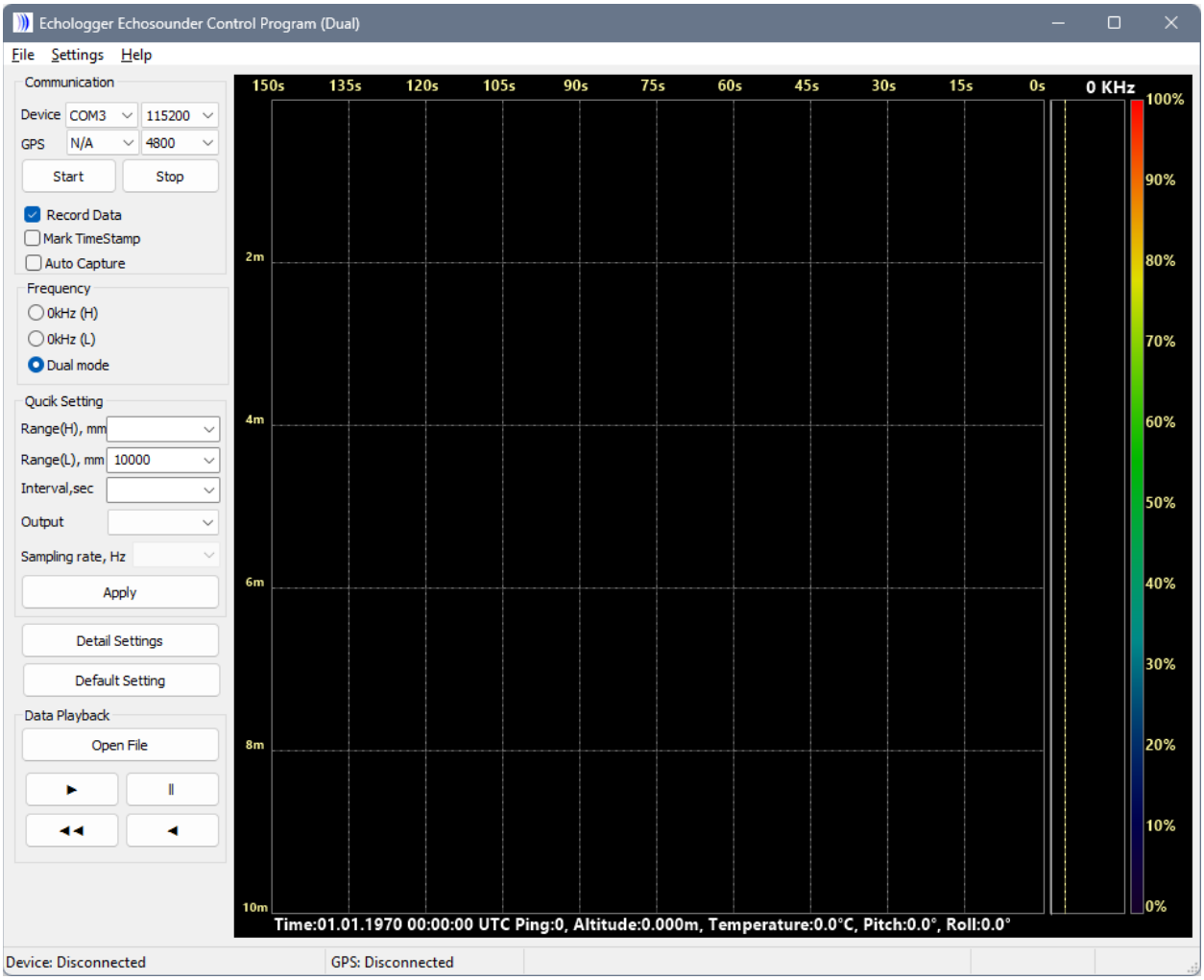
The control program is included on the USB dongle, if misplaced it is also available on seafloorsystems.com

Connect to the control program by selecting the COM port assigned to the echosounder.

Echosounder default baud rate: 115200

GPS: Does not need to be assigned as we are not logging in the control program.

Once connected you can use this program to monitor your bottom track as well as change the parameters of the system to better suit the environmental condition.



On the left-hand side of the window you can see the different parameters that can be changed. If both frequencies are to be used, ensure that the frequency option is set to “Dual mode”

On the right will be a bottom track of the system returns this can be utilized to better tune the system this is referred to as an echogram.

Parameters

The Setup Parameters, shown under the Detail Settings button, are as follows:

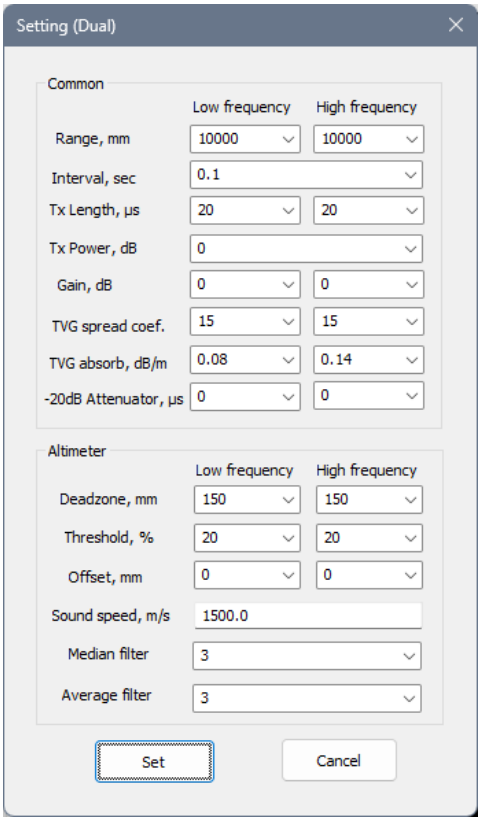
Common

- Range, m
  - Range in Meters
- Interval, sec
  - Interval (repetition rate) between pulses in seconds. (From 0.1 to 3600 (1 Hour))
- Tx Length, µsec
  - Set transmitted pulse length in microseconds. (Up to 100 µsec)
- Tx Power, dB
  - Sets pulse length output power in dB.
- Gain, dB
  - Analog gain of amplifier in dB
- TVG spread coef
  - Spreading coefficient of transmission losses for time variable gain (TVG). This t is a part of TVG formula: TVG(R) = K*log(R/R0) + R *ATL
- TVG absorb, dB/m
  - Absorption coefficient of transmission losses for TVG This is a part of TVG formula: TVG(R) = K*log(R/R0) + R *ATL.
- Attenuator, µs
  - Initial time interval to attenuate -20dB analog input

Altimeter

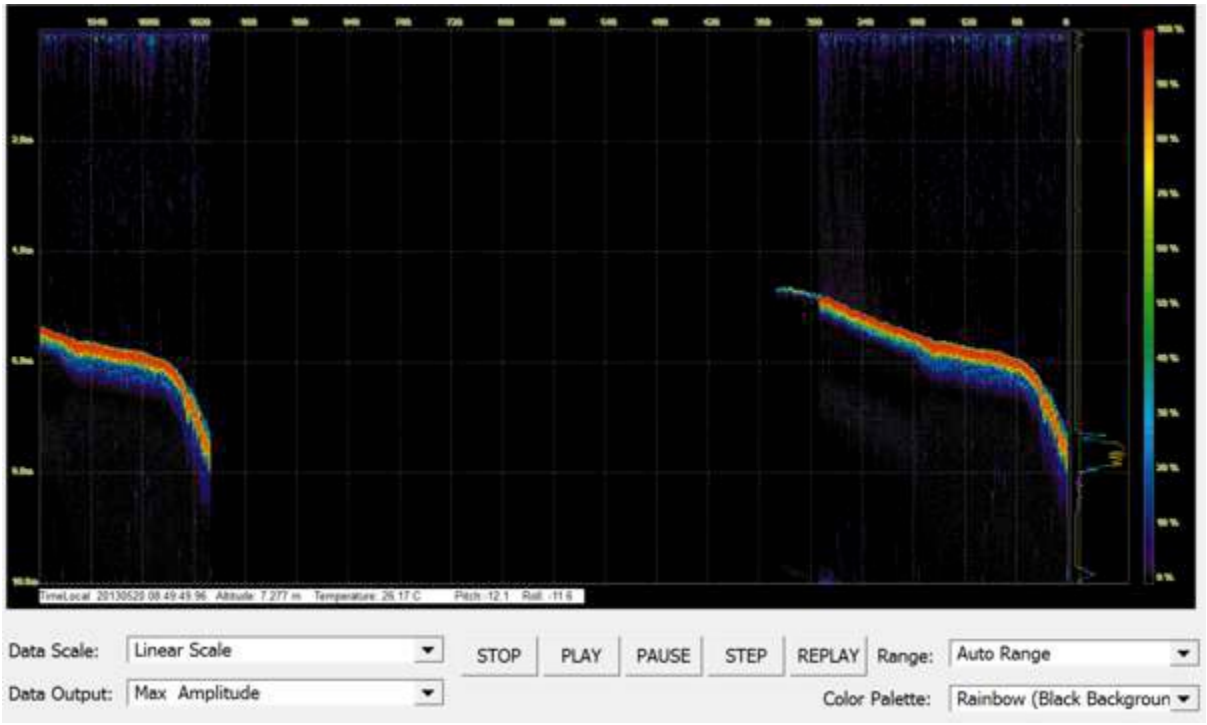
- Deadzone, mm
  - increase value to clock any unwanted surface noise that may be effecting the true bottom surface return.
- Offset, mm
  - Vertically offset the position of the device in millimeters.
- Altimeter Threshold, %
  - Altimeter threshold percentage of Full Scale (return sensitivity)
- Sound Speed, m/s
  - Speed of sound in water
- Output mode
  - Select output data formats

Each of these settings can be adjusted by using the drop-down menus. For the settings to be updated on the echosounder, one must hit “Apply” after any changes are made.

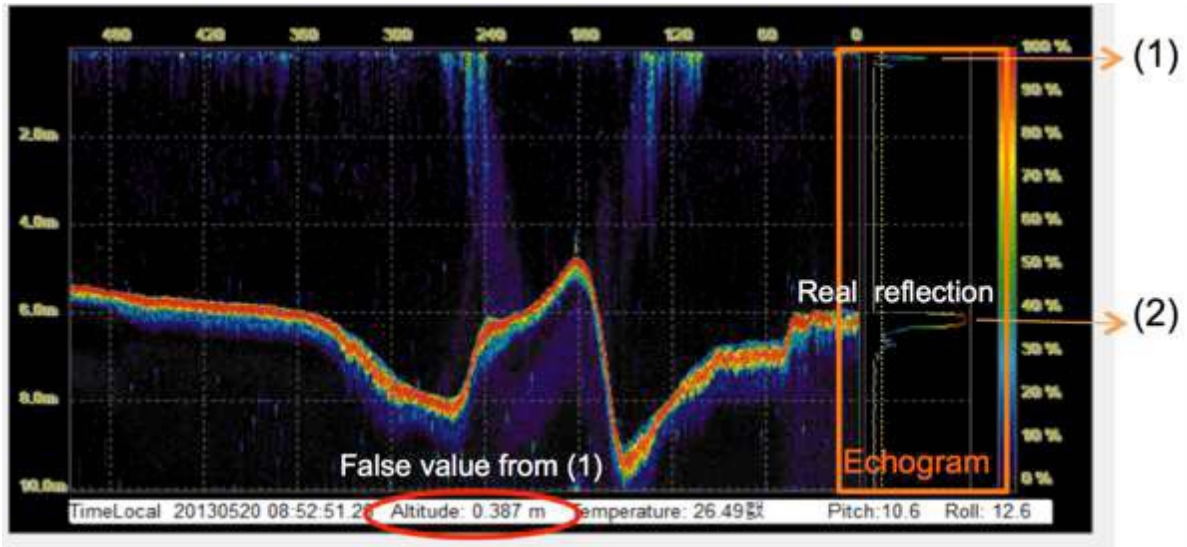


Echogram

The Echogram is an important feature of this system when data is being collected in software that can utilize the data to better post process the data. This is also a useful tool for configuration and troubleshooting issues. Below is an example of the echogram window and descriptions of the different functions.



When the real time returns are being shown in the echogram, the altitude is determined when the signal passes the set threshold parameter. For this reason, Altitude threshold, Deadzone, and Gain are the important settings when tuning the system. See example below.



All tuning should be conducted with the Output Mode: Echo Bin 12bit

Notice that the circled altitude is reporting a depth of 0.387 m. This is due to the initial reverberation
(1), being picked up as a return.

To avoid this, make sure that the Dead zone parameter, is large enough to bypass the reverberation and track the real reflection (2).

In altimeter modes (Simple, NMEA, PSA-916, OLD Sonarmite, Sonarmite DFX) increase the Gain, so the return signal can be saturated enough to strongly reflect the true bottom.

Furthermore, the altitude threshold should be as small as possible without generating returns off of the unwanted signals. If this is not set properly, the system will generate false returns from reflections in the water column and not off the true bottom.

Seafloor default settings:

	Low Frequency	High Frequency
Range	100000	100000
Interval	0.05	0.05
Tx Length	50	50
Tx Power	0	0
Gain	+6	+6
TVG spread coef.	15	10
TVG absorb	0.05	0.05
-20dB Attenuator	0	0
Deadzone	800	800
Threshold	10	10
Offset	0	0
Sound speed	1500	1500
Median filter	OFF	OFF
Average Filter	OFF	OFF

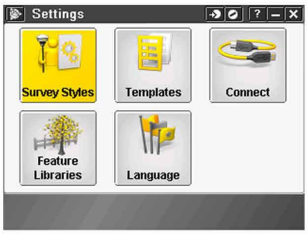
Trimble Access

Output Format: Sonarmite DFX

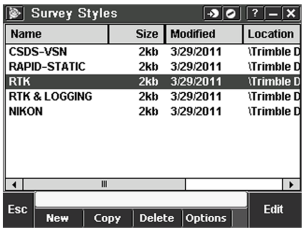
Data Example: 1 0.00 0.00 11.0 10 7

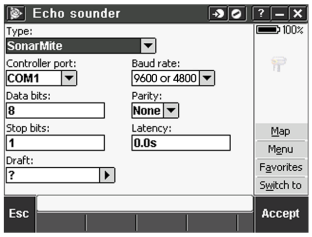
Connection Guide:

To Configure Survey Style
Upload custom style sheet (delimited w/depth applied).
From the Trimble Access menu, tap settings / survey styles / <Style name>

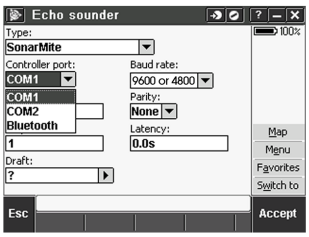


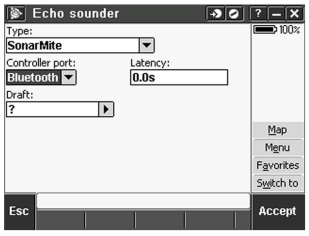
Tap Echosounder. Select an instrument from the type field.
Configure

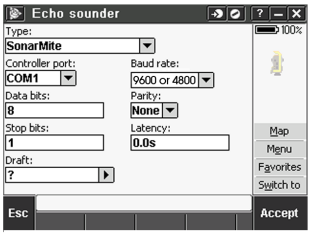




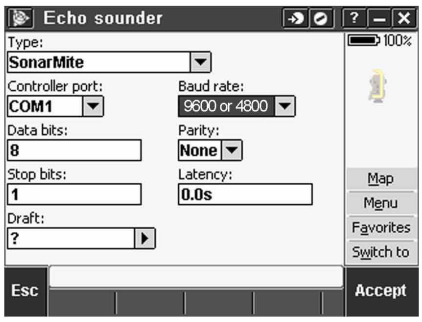
Configure the Controller port: If you set the Controller port to Bluetooth, you must configure the Echosounder bluetooth settings. If you set the Controller port to COM 1 or COM 2, you must configure the port settings.







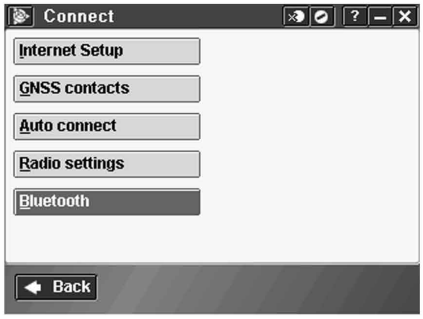
Latency and draft are normally left at 0. The latency caters for echo sounders where the depth is received by the controller after the position. General survey software uses the latency to match and store the depth when it is received with continuous topo points that were saved previously. Tap accept and then tap Store to save changes.

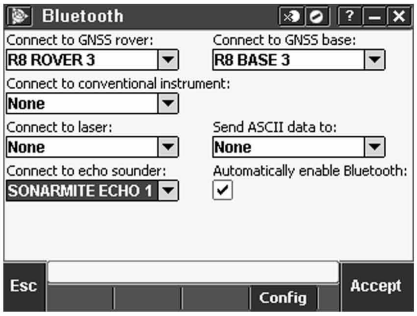


Bluetooth Partnership

Tap Settings from the main Trimble Access menu. Tap connect to continue. Select Bluetooth.

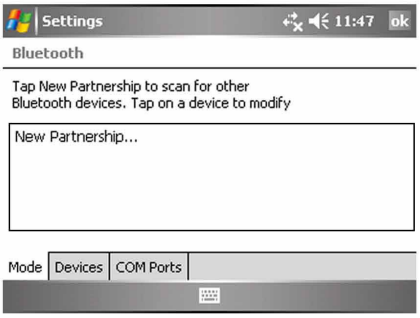
Survey styles - log by time, GPS output every .5 seconds

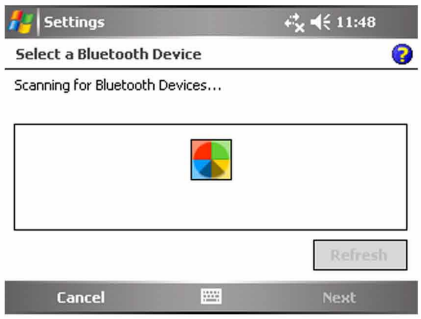




Tap Config and make sure that Bluetooth is switched on. On a TSC2 controller, make sure that the [turn on Bluetooth] and [Make this device discoverable to other devices] check boxes are selected. On a Trimble CU (model 3) controller, select the power tab and then make sure that the [enable Bluetooth] and [Discoverable] check boxes are selected. On a Trimble CU controller, make sure that the [Enable Bluetooth] checkbox is selected.

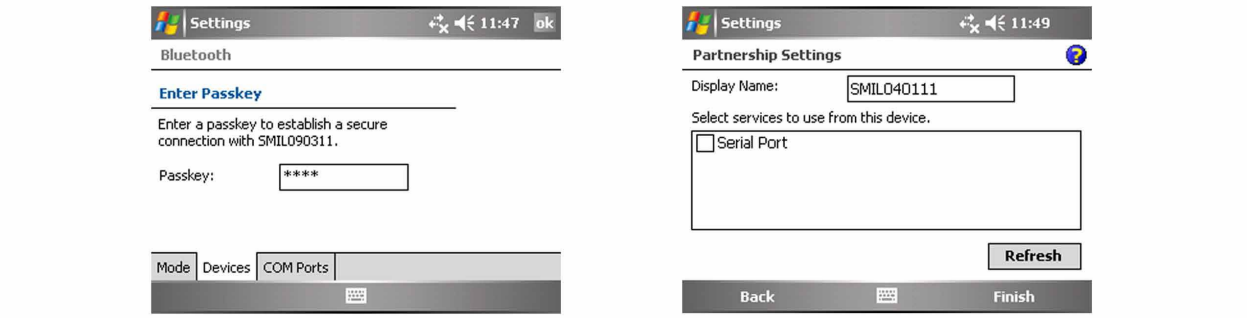
Start a scan on the controller. On a Trimble Tablet, Tap [Add a device]. On a TSC2 controller, tap the [devices] tab and tap. [New Partnership...]. On a Trimble CU (Model 3) controller, tap the [scan device] tab and then tap [scan]. On a Trimble CU controller, tap [Scan Device]. (Do not use [stop] - wait for the scan to complete.) Tip - Be sure that the transducer is plugged into the TXR before selecting the Bluetooth partnership.





Start a scan on the controller. On a Trimble Tablet, Tap [Add a device]. On a TSC2 controller, tap the [devices] tab and tap. [New Partnership...]. On a Trimble CU (Model 3) controller, tap the [scan device] tab and then tap [scan]. On a Trimble CU controller, tap [Scan Device]. (Do not use [stop] - wait for the scan to complete).

The controller searches for other Bluetooth devices within range. Once the scan is complete, highlight the Bluetooth device to connect to: On a Trimble Tablet tap [Next].



The Bluetooth Pin for this is set to: SEAFLOOR

Leave the serial port box empty. Tap finish and the Bluetooth will be configured.

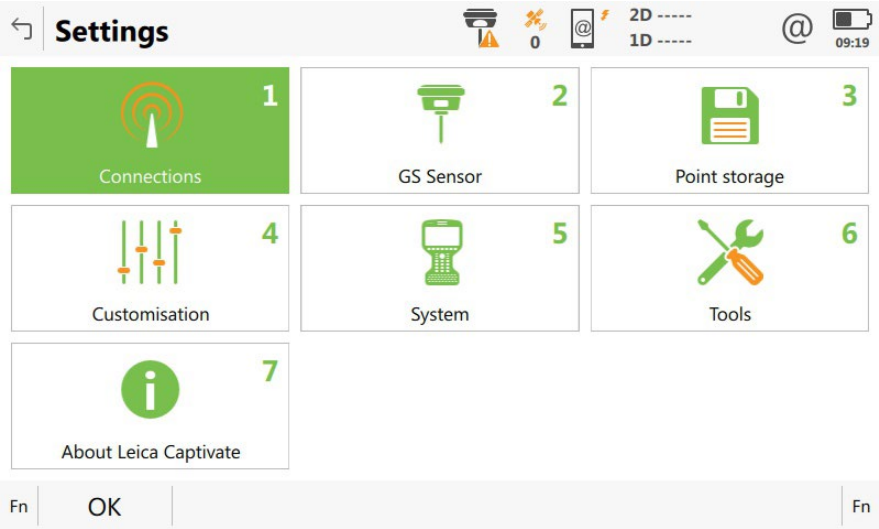
Leica Captivate

Output Format: Sonarmite OLD

Data Example: 1 0.00 0.00 11.0 10 7

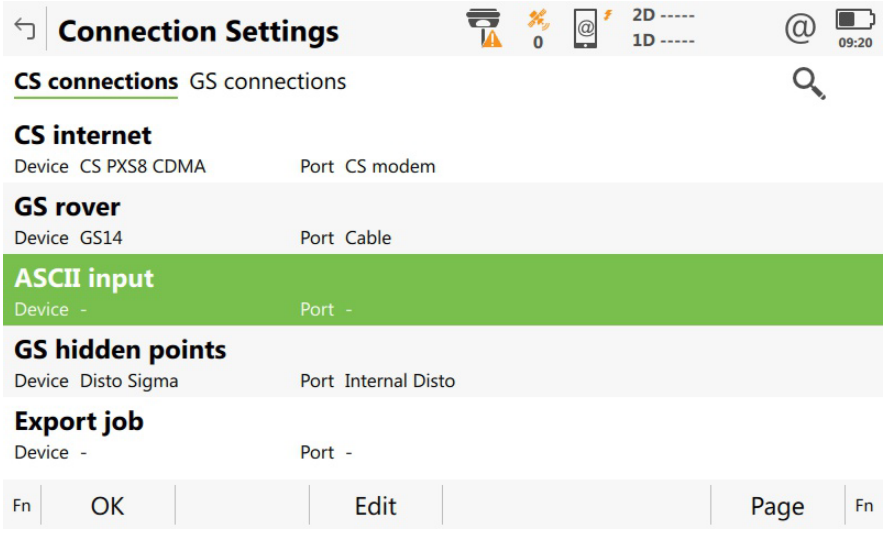
Connection Guide:

From the home screen go to Settings connections all other connections.



Highlight ASCII input.

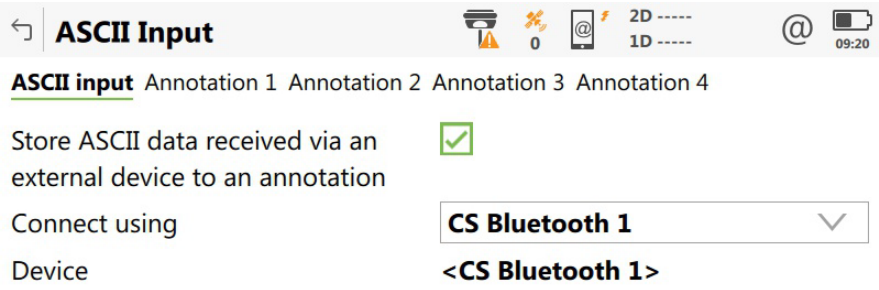
Select Edit



Check the box store ASCII data received via an.

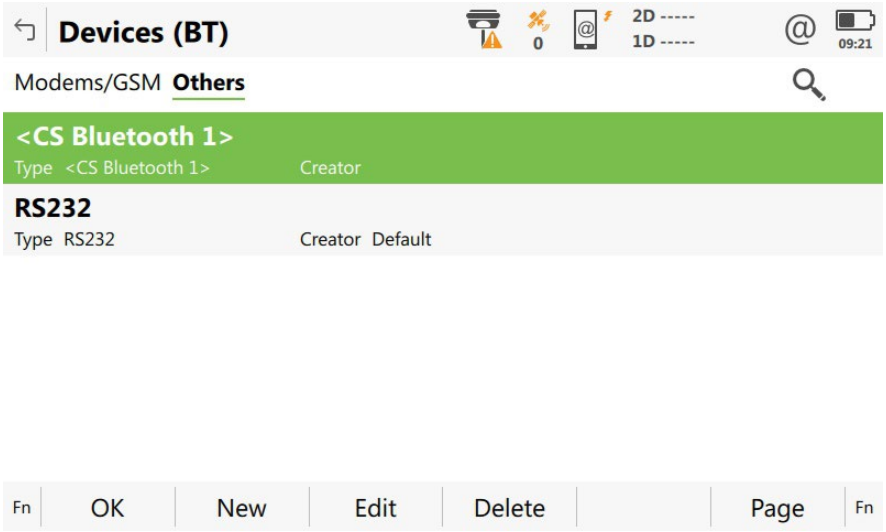
Use the pull down to choose Bluetooth 1, or Bluetooth 2.

Select Device on the bottom of page.



Use the down arrow on the thumb wheel to highlight RS232.

Select New at the bottom of the page.

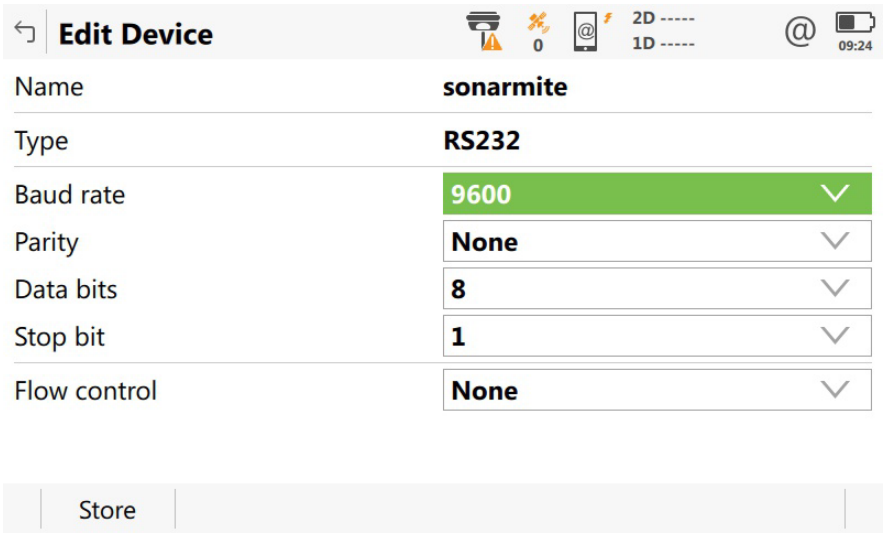


Fill in the Name

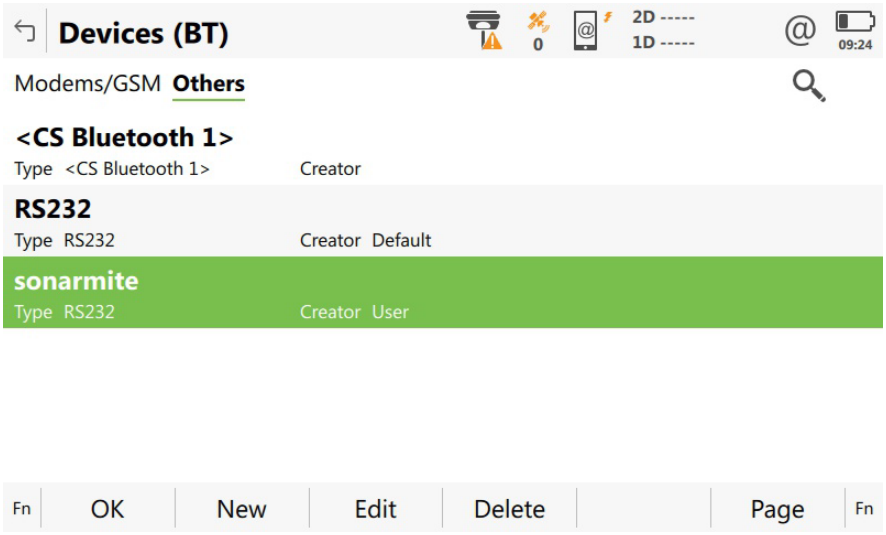
Change the baud to 4800

The rest of the settings should match the default, if not match the settings in the picture to the left.

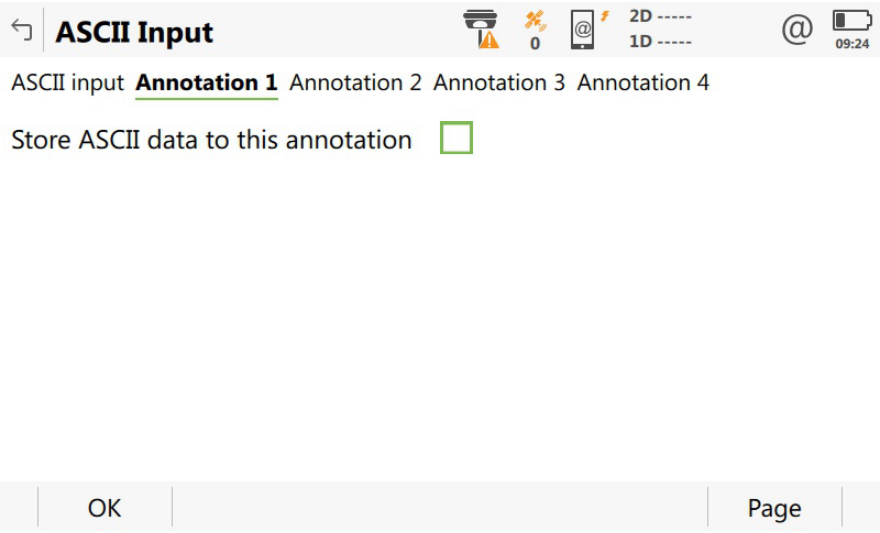
Select Store .



Select OK



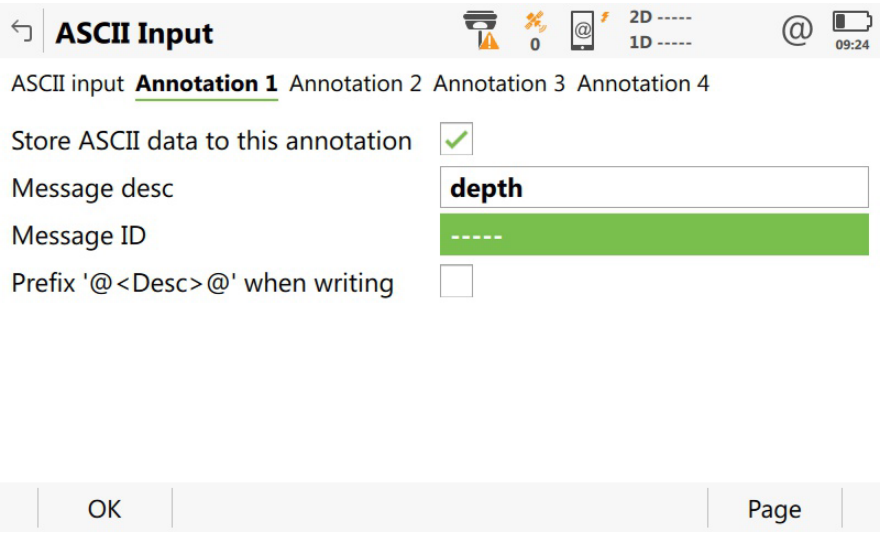
Page over to Annotation 1



Check the box Store ASCII data to this annotation.

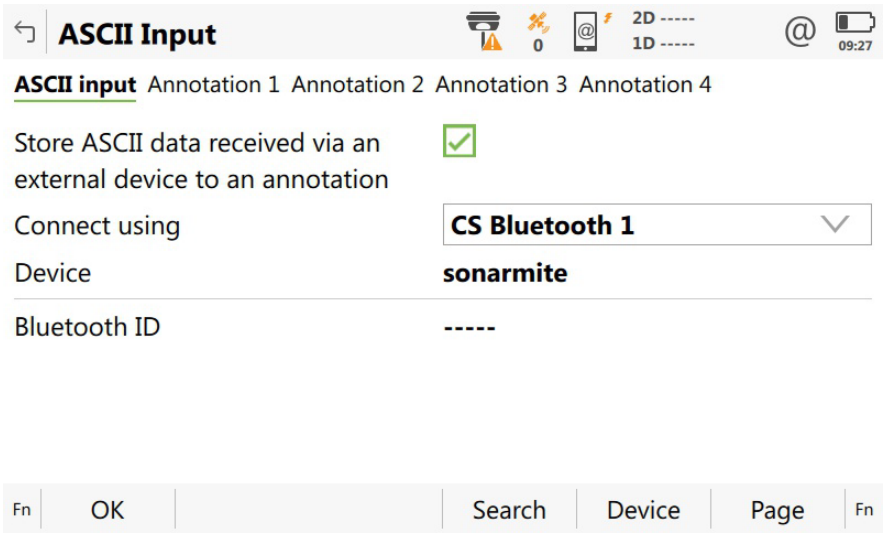
Message description enter **depth.**

Select OK

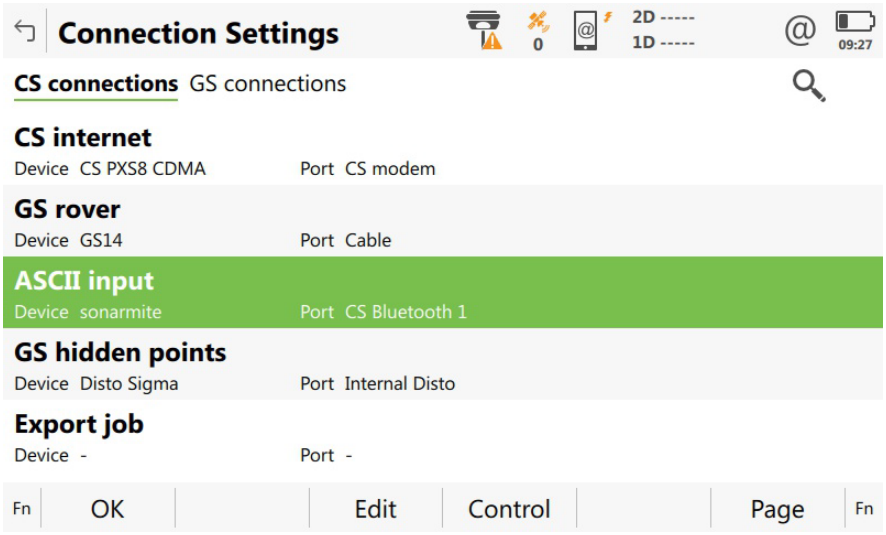


Search for device.

When through select OK



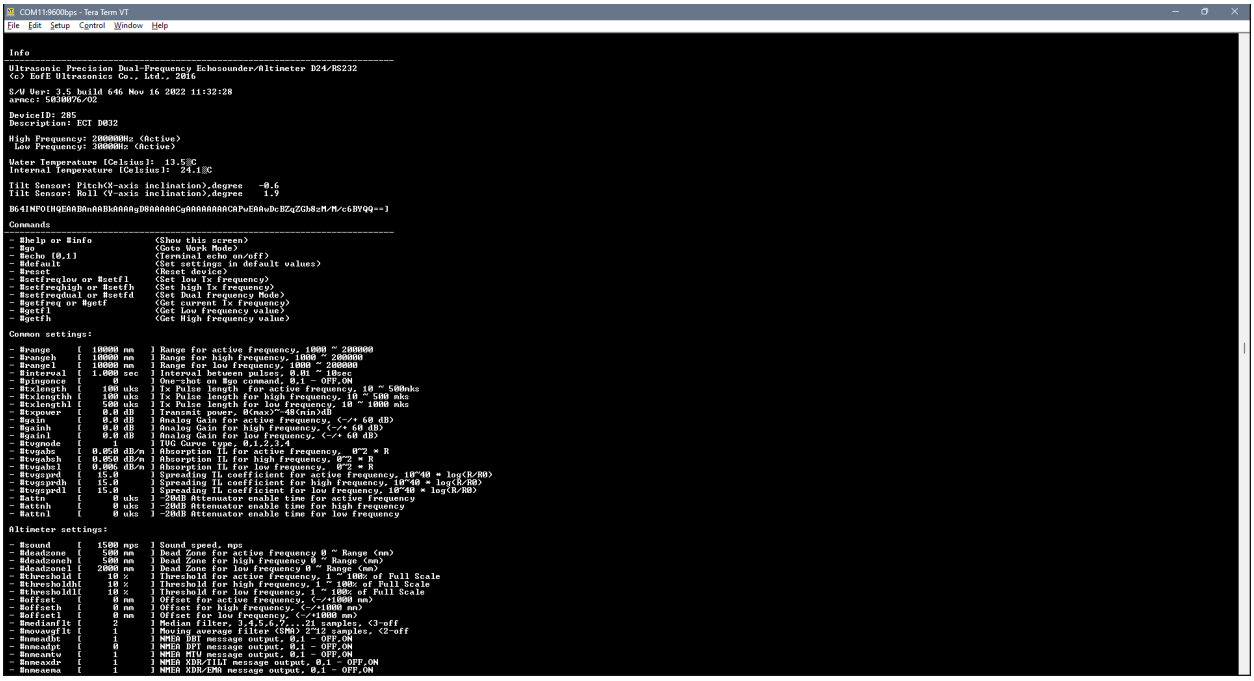
Select OK.



Use RS232 for Bluetooth per the instructions, but the baud rate has to be 115200. When searching for the sonarmite it connects right away and starts providing depths (if you have the baud rate correct). It does not wait until starting the mission and you do not have to enter a password. When setting up as US Survey Feet but the depths will come through in meters.

Terminal

The system can also be connected to a terminal program to quickly check and adjust settings or view the data being output. This is an alternative to the control program for adjusting settings, not recommended for tuning the system. The terminal can be used to alter the NMEA messages as well as adjust the baud rate of the system. These adjustments cannot be made in the control program and must be edited through the terminal program. See example below of the terminal program displaying settings of the echosounder.



Connect

Open TeraTerm. Click Setup>Serial port. Select the com port assigned to the system either hardwired or Bluetooth. Adjust baud rate to 115200. Then click “New Setting” to open the port.

Once connected, data will start coming across. To issue commands the data coming in needs to be stopped by pressing the space bar.

Commands

The next page contains a list of commands that can adjust the settings of the system.

Commands

Below is a list of commands that can adjust the settings of the system.

Command	Sample of input/output	Comments
#range	#range 10000 <ENTER> or >#range <ENTER> >Input Value: 10000<ENTER> >ok.	Set range in mm, from 1000 mm to 100000 mm
#rangeh	#rangeh 10000 <ENTER> or >#rangeh <ENTER> >Input Value: 10000<ENTER> >ok.	Range for high frequency, 1000 ~ 200000
#rangel	#rangel 10000 <ENTER> or >#rangel <ENTER> >Input Value: 10000<ENTER> >ok.	Range for low frequency, 1000 ~ 200000
#interval	#interval 0.5<ENTER> or # interval <ENTER>	Pulse repetition rate.
	>Input Value: 0.5<ENTER> >ok.	Set interval between pulses (pings) in seconds. From 0.1 to 3600 seconds

#pingonce	#pingonce 0<ENTER>	One-shot on #go command, 0,1 - OFF,ON
#threshold	#threshold 10<ENTER>	Set altimeter threshold in % of Full Scale (maximum amplitude of echo signal)
#threshold h	#thresholdh 10<ENTER>	Threshold for high frequency, 1 ~ 100% of Full Scale
#thresholdl	#thresholdl 10<ENTER>	Threshold for low frequency, 1 ~ 100% of Full Scale
#offset	#offset 0<ENTER>	Set offset of output altitude in mm
#offseth	#offseth 0<ENTER>	Offset for high frequency, (-/+1000 mm)
#offsetl	#offsetl 0<ENTER>	Offset for low frequency, (-/+1000 mm)
#deadzone	#deadzone 200<ENTER>	Set minimal deadzone in mm.
#deadzone h	#deadzoneh 200<ENTER>	Dead Zone for high frequency 0 ~ Range (mm)

#deadzonel	#deadzonel 200<ENTER>	Dead Zone for low frequency 0 ~ Range (mm)
#txlength	#txlength 20<ENTER>	Set transmitted pulse length in microseconds. Max. value 100 uks.
#txlengthh	#txlengthh 20<ENTER>	Tx Pulse length for high frequency, 10 ~ 500 mks
#txlengthl	#txlengthl 20<ENTER>	Tx Pulse length for low frequency, 10 ~ 1000 mks
#output	#output 1<ENTER>	Output format 1,2,3,4 1 - Altimeter Simple 2 - EchoSounder txt 10bits 3 - Altimeter NMEA 4 - EchoSounder txt 12bits 6 - DESO-25 (Metric Mode, A - HF, B - LF) 7 - Altimeter Dual (Date, Time, HF, LF) 8 - SONARMITE_DFX(ID, HF, LF,

		Temp, Batt, Flags) 9 - SONARMITE_OLD(ID, Depth, Roll, Pitch, Heave, Batt, Qa, Flags) 100 - EchoSounder binary 12bits 101 - EchoSounder binary 8bits (12bits compressed to 8bits)
#gain	#gain 3<ENTER>	Set analog gain of preampli-fier in dB.
#gainh	#gainh 3<ENTER>	Analog Gain for high frequency, (-/+ 60 dB)
#gainl	#gainl 3<ENTER>	Analog Gain for low frequency, (-/+ 60 dB)
#tvgmode	#tvgmode 1<ENTER>	TVG Curve type, 0,1,2,3,4
#tvgabs	#tvgabs 0.05<ENTER>	Absorption TL for active frequency, 0~2 * R
#tvgabsh	#tvgabsh 0.05<ENTER>	Absorption TL for high frequency, 0~2 * R
#tvgabsl	#tvgabsl 0.05<ENTER>	Absorption TL for low frequency, 0~2 * R

#tvgsprd	#tvgsprd 15<ENTER>	Spreading TL coefficient for active frequency, 10~40 * log(R/R0)
#tvgsprdh	#tvgsprdh 15<ENTER>	Spreading TL coefficient for high frequency, 10~40 * log(R/R0)
#tvgsprdl	#tvgsprdl 15<ENTER>	Spreading TL coefficient for low frequency, 10~40 * log(R/R0)
#attn	#attn 0<ENTER>	-20dB Attenuator enable time for active frequency
#attnh	#attnh 0<ENTER>	-20dB Attenuator enable time for high frequency
#attnl	#attnl 0<ENTER>	-20dB Attenuator enable time for low frequency
#speed	#speed 4800<ENTER>	Set serial port speed in bods. User can set: - 4800 - 9600 - 19200 - 38400 - 57600 - 115200 - 230400 - 460800

		- 921600
#nmeadbt	#nmeadbt 1<ENTER>	$GPDBT message enable - 1, disable - 0
#nmeadpt	#nmeadpt 1<ENTER>	$GPDPT message enable - 1, disable - 0
#nmeamtw	#nmeamtw 1<ENTER>	$GPMTW message enable - 1, disable - 0
#nmeaxdr	#nmeaxdr 1<ENTER>	$GPXDR message enable - 1, disable - 0
#nmeaema	#nmeaema 1<ENTER>	$GPEMA message enable - 1, disable - 0
#nmeazda	#nmeazda 1<ENTER>	NMEA ZDA message output, 0,1 - OFF,ON
#nmearate	#nmearate 0<ENTER>	NMEA min. interval, 0~1sec, 0 - same as #interval
#nmeadptoff	#nmeadptoff 0<ENTER>	NMEA DPT offset value (-/+ 50 m)
#nmeadpzero	#nmeadpzero 1<ENTER>	NMEA DPT/DBT show zero if no signal, 0,1 - OFF/ON
#sound	#sound 1500<ENTER>	Set sound speed in water.
#help or #info	Info ----------	Show device state and

	Ultrasonic Precision Dual-Frequency Echosounder/Altimeter D24/RS232 (c) EofE Ultrasonics Co., Ltd., 2016 S/W Ver: 3.5 build 646 Nov 16 2022 11:32:28 armcc: 5030076/O2 DeviceID: 285 Description: ECT D032 High Frequency: 200000Hz (Active) Low Frequency: 30000Hz (Active) Water Temperature [Celsius]: 13.5°C Internal Temperature [Celsius]: 24.1°C Tilt Sensor: Pitch(X-axis inclination),degree -0.6 Tilt Sensor: Roll (Y-axis inclination),degree 1.9 B64INFO[HQEAABAnAABkAAAAgD8AAAAACgAAAAAAAACAPwEAAwDcBZqZGb8zM/M/c6BYQQ==] Commands --- - #help or #info (Show this screen) - #go (Goto Work Mode) - #echo [0,1] (Terminal echo on/off) - #default (Set settings in default values) - #reset (Reset device) - #setfreqlow or #setfl (Set low Tx frequency) - #setfreqhigh or #setfh (Set high Tx frequency) - #setfreqdual or #setfd (Set Dual frequency Mode) - #getfreq or #getf (Get current Tx frequency) - #getfl (Get Low frequency value) - #getfh (Get High frequency value) Common settings: - #range [10000 mm] Range for active frequency, 1000 ~ 200000 - #rangeh [10000 mm] Range for high frequency, 1000 ~ 200000 - #rangel [10000 mm] Range for low frequency, 1000 ~ 200000 - #interval [1.000 sec] Interval between pulses, 0.01 ~ 10sec - #pingonce [0] One-shot on #go command, 0,1 - OFF,ON - #txlength [100 uks] Tx Pulse length for active frequency, 10 ~ 500mks	information about parameters and commands.

	- #txlengthh [100 uks] Tx Pulse length for high frequency, 10 ~ 500 mks - #txlengthl [500 uks] Tx Pulse length for low frequency, 10 ~ 1000 mks - #txpower [0.0 dB] Transmit power, 0(max)~-48(min)dB - #gain [0.0 dB] Analog Gain for active frequency, (-/+ 60 dB) - #gainh [0.0 dB] Analog Gain for high frequency, (-/+ 60 dB) - #gainl [0.0 dB] Analog Gain for low frequency, (-/+ 60 dB) - #tvgmode [1] TVG Curve type, 0,1,2,3,4 - #tvgabs [0.050 dB/m] Absorption TL for active frequency, 0~2 * R - #tvgabsh [0.050 dB/m] Absorption TL for high frequency, 0~2 * R - #tvgabsl [0.006 dB/m] Absorption TL for low frequency, 0~2 * R - #tvgsprd [15.0] Spreading TL coefficient for active frequency, 10~40 * log(R/R0) - #tvgsprdh [15.0] Spreading TL coefficient for high frequency, 10~40 * log(R/R0) - #tvgsprdl [15.0] Spreading TL coefficient for low frequency, 10~40 * log(R/R0) - #attn [0 uks] -20dB Attenuator enable time for active frequency - #attnh [0 uks] -20dB Attenuator enable time for high frequency - #attnl [0 uks] -20dB Attenuator enable time for low frequency Altimeter settings: - #sound [1500 mps] Sound speed, mps - #deadzone [500 mm] Dead Zone for active frequency 0 ~ Range (mm) - #deadzoneh [500 mm] Dead Zone for high frequency 0 ~ Range (mm) - #deadzonel [2000 mm] Dead Zone for low frequency 0 ~ Range (mm) - #threshold [10 %] Threshold for active frequency, 1 ~ 100% of Full Scale - #thresholdh[10 %] Threshold for high frequency, 1 ~ 100% of Full Scale - #thresholdl[10 %] Threshold for low frequency, 1 ~ 100% of Full Scale - #offset [0 mm] Offset for active frequency, (-/+1000 mm) - #offseth [0 mm] Offset for high frequency, (-/+1000 mm) - #offsetl [0 mm] Offset for low frequency, (-/+1000 mm) - #medianflt [2] Median filter, 3,4,5,6,7,...21 samples, <3-off - #movavgflt [1] Moving average filter (SMA) 2~12 samples, <2-off - #nmeadbt [1] NMEA DBT message output, 0,1 - OFF,ON	

	- #nmeadpt [0] NMEA DPT message output, 0,1 - OFF,ON - #nmeamtw [1] NMEA MTW message output, 0,1 - OFF,ON - #nmeaxdr [1] NMEA XDR/TILT message output, 0,1 - OFF,ON - #nmeaema [1] NMEA XDR/EMA message output, 0,1 - OFF,ON - #nmeazda [1] NMEA ZDA message output, 0,1 - OFF,ON - #nmearate [0.000 sec] NMEA min. interval, 0~1sec, 0 - same as #interval - #nmeadptoff[0.000 m] NMEA DPT offset value (-/+ 50 m) - #nmeadpzero[1] NMEA DPT/DBT show zero if no signal, 0,1 - OFF/ON Input/Output settings: - #output [3] Output format 1,2,3,4 1 - Altimeter Simple 2 - EchoSounder txt 10bits 3 - Altimeter NMEA 4 - EchoSounder txt 12bits 6 - DESO-25 (Metric Mode, A - HF, B - LF) 7 - Altimeter Dual (Date, Time, HF, LF) 8 - SONARMITE_DFX(ID, HF, LF, Temp, Batt, Flags) 9 - SONARMITE_OLD(ID, Depth, Roll, Pitch, Heave, Batt, Qa, Flags) 100 - EchoSounder binary 12bits 101 - EchoSounder binary 8bits (12bits compressed to 8bits) - #samplfreq [0] Sampling rate. [6250,12500,25000,50000,100000]Hz, 0 - Auto - #speed or - #baudrate [115200] Baud Rate, 2400-921600, 8N1 - #time [353] Seconds since 00:00 hours, Jan 1, 1970 UTC Synchronization: - #syncextern[0] Sync Direction, 0,1 - Internal,External - #syncextmod[1] External Sync Pulse edge, 0,1 - Falling,Rising - #syncoutpol[1] Sync Pulse Output Polarity, 0,1 - Low,High Analog output: - #anlgmode [0] Analog output mode, 0,1 - Distance,Envelope - #anlgrate [0.100 V/m] Analog output rate 0.005~10V/m - #anlgmax [4] Max. output voltage, 1,2,3,4 - 1.25V,2.5V,5V,10V	

	Multinode interface: - #mniface [0] Multinode interface, 0,1 - OFF,ON - #mnid [1] Multinode id 1~240 - #mnsync [0] Multinode sync, 0,1,2 - Int,Ext,Packet	
#go	#go<ENTER>	Start send pulses and receive echo signal
#default	<ENTER>	Set default values: - range: 10000mm - interval: 1 sec - deadzone: 300 mm - offset: 0mm - threshold: 10% - txlength 20 uks - gain 0 dB - tvgmode: 1 - tvg slope 1 output mode: NMEA

Change of Record

6-20-2023Creation Date (V1.0)