SEAS TSG Data Recorder User's Guide

Introduction



The SBE 45 MicroTSG Thermosalinograph is externally powered, high accuracy, conductivity and temperature recorders, designed for shipboard determination of sea surface (pumped-water) conductivity and temperature.

The SEAS TSG (Thermosalinograph) Data Recorder is a real time data acquisition, data processing, and data recording application that operates on vessels where there is a SBE 45 MicroTSG Thermosalinograph unit installed collecting TSG data. It receives continuously the measured sea surface temperature and conductivity data over the serial port RS-232.

SEAS Transceiver Interface application or a <u>NMEA</u> device gives the ship's position. Every received TSG data is archived in a file that will be zipped at 12:00 am every day, and will be copied to the Iridium's queue for the transmission via satellite.

The user can sets the collection sampling interval in seconds between samples that the SEAS TSG Data Recorder takes and archives, and the transmission sampling interval in seconds between samples that the SEAS TSG Data Recorder takes and put ready to transmit.

It was developed in the Integrated Development Environment (IDE) from Microsoft Visual Studio C++ 2008 Standard Edition under Windows 7.

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How does it work?

SBE 45 MicroTSG Thermosalinograph

Hardware installation



System communication

The Interface Box merges GPS data and SBE 38 remote temperature data with SBE 45 data. The data, in ASCII engineering units, is passed to the computer for storage and/or display.



Once the system is ready for deployment is important to paid attention to the serial port settings on the SEAS TSG Data Recorder side. The length of the cable and the baud rate are related, see hardware documentation for more information.

Computer serial port setting:

	SBE 45 MicroTSG
Baud rate	9600
Data bits	8
Parity	None
Stop bits	1
Flow Control	None

The time between each output scan is governed by the <u>SBE 45 MicroTSG</u> setup. The <u>Interface Box</u> outputs the most recent data from the <u>SBE 38 remote temperature sensor</u> and/or GPS device with each scan of SBE 45 data. The SEAS TSG Data Recorder set the sampling interval to 1 second as default.

📕 TSG Recorded Data.txt - 1	d	
<u>File E</u> dit F <u>o</u> rmat <u>V</u> iew <u>H</u> elp		
t1= 22.3491, c1=-0.000 t1= 22.3489, c1=-0.000 t1= 22.3489, c1=-0.000 t1= 22.3488, c1=-0.000 t1= 22.3489, c1=-0.000 t1= 22.3494, c1=-0.000 t1= 22.3494, c1=-0.000 t1= 22.3497, c1=-0.000 t1= 22.3497, c1=-0.000 t1= 22.3497, c1=-0.000	 = 0.0000, sv=1489.345, t2= 22.2668, lat=37 58.1752 N, lon=123 04.4035 W, hms=2256 = 0.0000, sv=1489.345, t2= 22.2670, lat=37 58.1807 N, lon=123 04.4047 W, hms=2256 = 0.0000, sv=1489.345, t2= 22.2668, lat=37 58.1807 N, lon=123 04.4058 W, hms=2256 = 0.0000, sv=1489.344, t2= 22.2675, lat=37 58.1917 N, lon=123 04.4069 W, hms=2256 = 0.0000, sv=1489.345, t2= 22.2674, lat=37 58.1972 N, lon=123 04.4069 W, hms=2256 = 0.0000, sv=1489.346, t2= 22.2678, lat=37 58.1972 N, lon=123 04.4080 W, hms=2257 = 0.0000, sv=1489.346, t2= 22.2676, lat=37 58.2081 N, lon=123 04.4091 W, hms=2257 = 0.0000, sv=1489.347, t2= 22.2670, lat=37 58.2191 N, lon=123 04.4124 W, hms=2257 = 0.0000, sv=1489.347, t2= 22.2677, lat=37 58.2260 N, lon=123 04.4132 W, hms=2257 = 0.0000, sv=1489.347, t2= 22.2677, lat=37 58.2020 N, lon=123 04.4132 W, hms=2257 = 0.0000, sv=1489.347, t2= 22.2679, lat=37 58.2020 N, lon=123 04.4132 W, hms=2257 = 0.0000, sv=1489.347, t2= 22.2677, lat=37 58.2020 N, lon=123 04.4132 W, hms=2257 = 0.0000, sv=1489.347, t2= 22.2679, lat=37 58.2020 N, lon=123 04.4132 W, hms=2257 = 0.0000, sv=1489.347, t2= 22.2679, lat=37 58.2020 N, lon=123 04.4139 W, hms=2257 = 0.0000, sv=1489.347, t2= 22.2679, lat=37 58.2020 N, lon=123 04.4139 W, hms=2257 	55, dmy=260501 56, dmy=260501 57, dmy=260501 58, dmy=260501 59, dmy=260501 00, dmy=260501 01, dmy=260501 02, dmy=260501 03, dmy=260501 04, dmy=260501 05, dmy=260501
<		> .:

User Interface

The Graphic User Interface (GUI) is simple, and makes the application interfaces intuitive, learnable, and consistent. To do easier the work with the application, the controls, and assesses are grouped.

SEAS TSG Data Recorder
File View Setup Tools Help Info
Serial port setup COM Bits per second Data bits Parity Stop bits Flow control TSG unit Collection Transmission
Ship Name IMO Number Call sign speed Name Email Phone alternate Name alternate Email alternate Phone
SEA5_TEST 12345678 TEST567 Invalid Inots Carlos I Perez Carlos i.perez@no 305-521-9406
Parsed TSG data ready to archive Raw incomming TSG data
Date Time TSG Tem TSG Con Salinity Sound Ve Remote T Latitude Longitude 🔺 Raw
02-15-2002 01:20:49 22.0420 5.21183 36.6679 1531.527 23.1002 38 03 702 N 1231 2960 W 03-15-2002 01:20:40 22.0401 5.21168 36.6663 1531.467 23.0760 38 03 666 N 1231 3004 W 03-15-2002 01:20:10 22.0361 5.21154 36.6664 1531.344 23.0277 38 03 629 N 1231 3044 W 03-15-2002 01:20:119 22.0375 5.21154 36.6664 1531.344 23.0277 38 03 562 N 1231 3049 W 03-15-2002 01:20:10 22.0375 5.21154 36.6663 1531.345 22.9999 38 03 57 N 1231 3098 W 03-15-2002 01:20:10 22.0375 5.2116 36.6663 1531.136 22.9493 38 03 597 N 1231 3109 W 03-15-2002 01:20:10 22.0375 5.2119 36.6663 1531.136 22.9493 38 03 597 N 1231 3107 W 03-15-2002 01:20:10 22.0375 5.2110 36.6663 1531.136 22.9493 38 03 597 N 1231 317 W 03-15-2002 01:20:10 22.0375 5.2110 36.6663 1531.136 22.9494 38 03 949 N 1231 3177 W 03-15-2002 01:20:01 22.0375 5.2110 36.6663 1531.106 22.9494 38 03 949 N 1231 3177 W 03-15-2002 01:20:01 22.0375 5.2110 36.6663 1531.106 22.9494 38 03 949 N 1231 3177 W
VYYY - MM - DD HH : MM HH : MM HH : MM YYYY - MM-DD HH:MM VYYY - MM - DD HH : MM HH : MM HH : MM YYYY - MM-DD HH:MM Delayed 2011 - 03 - 14 17 : 04 03 - 15 17 : 33 Interval 24 : 00 Last 2010-12-21 20:04:05 Image: No transmission when ship is stopped Countdown 23:57:10 Next 2011-03-15 17:33:00 Save Image: No transmission is allowed V Satellite transmission is allowed V V V V V
Serial Success. Data read OK. NUM Mar 14, 2011 17:36:00 //

Main screen

Serial port setup group: Sets up the serial port communication.

On: Starts or stops the read data task via serial port.

Instrument group: Chooses the used TSG unit (SBE 45).

Sampling interval group: Sets up the sampling interval.

Collection: Sampling interval in seconds between samples that the SEAS TSG Data Recorder takes and archives.

Transmission: Sampling interval in seconds between samples that the SEAS TSG Data Recorder takes and put ready to transmit.

GPS data source group: Selects the source to read the GPS data. It could be the connected <u>NMEA</u> device to the Interface Box, the SEAS Transceiver Interface application, or another application running in a remote computer that transmits data across the wire.

Ship setup group: Shows the ship information, and displays the ship's speed.

Technician setup group: Name, Email and **Phone** show the TSG technician's information, **alternate Name, alternate Email** and **alternate Phone** are for the alternate TSG technician.

Parsed TSG data ready to archive list: Displays the incomming TSG and GPS data, this read from SEAS Transceiver Interface or from <u>NMEA</u> device. These collected data will be recorded into ...**Archive\TsgDataRecorder\SrvArchv** directory.

Raw incomming TSG data list: Displays the read ASCII string received from the TSG unit. The information is giving in following format:

t1= 22.3107, c1=-0.00027, s= 0.0000, sv=1489.235, t2= 22.4613[, lat= 25 44.07 N, lon= 080 09.71 W, hms= 131234, dmy= 290410]

Where

- t1 = SBE 45 temperature
- c1 = SBE 45 conductivity
- s = salinity
- sv = sound velocity
- t2 = SBE 38 temperature
- lat = latitude from NMEA navigation device
- lon = longitude from NMEA navigation device
- hms = time from NMEA navigation device
- dmy = date from NMEA navigation device

Each scan ends with a carriage return <CR> and line feed <LF>.

Collection group: Sets up the collection process. The collection of data can be **Delayed** until a future time; this is when the collection of data will begin for transmission. This could be used if the user is in port and he know when will be leaving later.

Transmission group: Sets the transmission process setup, and display information.

Begin: Sets the time to begin the transmission process.

No transmission when ship is stopped: Chooses if the collected data to transmit will be transmitted when the ship is stopped (speed less than or equal to 1 knot) or not.

Satellite transmission is allowed: Starts or stops the task that copies the recorded data to the Iridium's queue for the real transmission via satellite using the Iridium Mailer Service.

Interval: Sets the transmission lapse in which the data will be transmitted; it should be greater or equal 5 minutes, the time it takes to make the application initialization.

Countdown: Displays the time remaining for the next transmission.

Last: Shows the moment when the last transmission took place.

Next: Displays the moment when the next transmission will take place.

Button Save: Makes active the new application configuration, and saves any configuration change from serial port, TSG unit, ship or technician into TsgDataRecorder.ini file.

Status bar: Provides status information from serial port communication, and application.

Main Menu

File > Maximize: This command is always disabled see system tray to know how to maximize the SEAS TSG Data Recorder application window.

😸 SEAS TSG Data Recorder								
<u>F</u> ile	⊻iew	Setup	<u>T</u> ools	<u>H</u> elp	Info			
M	aximize	1						
М	inimize	sel	tup ——					
Exit		0 0	1	Bits p secon	er Id	Data	bits	
		n Co	M4 👻	9600		8	-	

File > Minimize: Use this command to minimize the SEAS TSG Data Recorder application window. An icon will be display in the system tray.

😸 SEAS TSG Data Recorder								
File	⊻iew	<u>S</u> etup	<u>T</u> ools	<u>H</u> elp	Info			
М	aximize							
M	inimize	set	setup					
Exit		Mo	1	Bits p secon	er id	Data bits		
		n Co	M4 💌	9600) 🚽	8 🔻		

The notification area -commonly referred as the system tray for Microsoft- is the portion of the taskbar usually at the bottom right corner that



displays icons for easy access to system functions such as printer, modem, sound volume, battery status, and more. It is used to launch and monitor running applications.

A single right click on the tray icon will bring up a menu while a double click will perform the default action (**Minimize** or **Maximize** the SEAS TSG Data Recorder application window).

About SEAS TSG Data Recorder	
Maximize Minimize	
Help	
Exit	28 📷 2:12 PM

File > Exit: Use this command to exit the SEAS TSG Data Recorder application.

😸 SEAS TSG Data Recorder								
Eile	<u>V</u> iew	<u>S</u> etup	<u>T</u> ools	<u>H</u> elp	Info			
М	aximize							
M	inimize	set	:up ——					
Exit		oM	1	Bits p secon	er id	Data	bits	
			M4 💌	9600) 🚽	8	-	

Since the SEAS TSG Data Recorder needs to stay running all the time unless they are explicitly terminated it prompts the user for a password to exit the application.

Password nedded to exit						
Password:	OK					

View > Status Bar: Use this command to show or hide the status bar.

TSC S	😸 SEAS TSG Data Recorder								
<u>F</u> ile	⊻iew	<u>S</u> etup	<u>T</u> ools	<u>H</u> elp	Info				
	🗸 Sta	atus Bar							
	Serial	port set	up	Dib					

This command displays and hides the status bar, which describes the action to be executed by the selected menu item, and keyboard latch state. A checkmark appears next to the menu item when the status bar is displayed.

The status bar is displayed at the bottom of the SEAS TSG Data Recorder window. The left area of the status bar describes actions of menu items as you use the arrow keys to navigate through menus. This area similarly shows messages that describe the application's status.

The right areas of the status bar indicate which of the following keys are latched down:

Indicator	Description
CAP	The Caps Lock key is latched down.
NUM	The Num Lock key is latched down.
SCRL	The Scroll Lock key is latched down.
DATE	The system clock.

Setup > Transmission queue directory: Use this command to select the transmission queue path.



Using this command you can select the transmission queue directory, where SEAS TSG Data Recorder will post the files ready to transmit. A **Browser for Folder** dialog appears that allows the user to select a folder.

When this dialog box comes up, it displays the **Desktop** folder as the parent and all the other folders can be located from it. To use it, the user can click one of the folders or drives and click **OK**. If the desired folder is not seen but is available, the user can expand the existing folders and drives, click the desired folder, and click **OK**. If the necessary folder is not available at all, the user should first create the desired folder outside the application.



Setup > Reading calibration coefficients: Use this command to select if the SEAS TSG Data Recorder read the calibration coefficients from the <u>SBE 45 MicroTSG</u>, and <u>SBE 38</u> remote temperature sensor, and updates the GUI automatically or the user has to type them.

😸 SEAS TSG Data Recorder									
File	View	Setup	Tools	Help	Info		_		
	- · ·	Tran	smissio						
	-Serial	Reading calibration coefficients 🔸				Þ	✓ Manual		
		Rem	iote GPS	5 data s	Þ	Automatic	ľ		
	l∧ D	Remote command settings						I	
	Chin in	Formatio	-			_			

Setup > Remote GPS data source|**Computer settings:** Use this command to set the IP address, and the port number of the remote computer, which provides a GPRMC sentence.

😸 SEAS TSG Data Recorder										
File	View	Setup	Tools	Help	Info					
		Tran	smission	queue	direc	tory		1		
	-Serial	Rea	ding calib	ration	coeffi	•	e Davitu	Stop bits		
		Rem	ote GPS	data so	ource		•	Computer se	ettings	
	N DI	Rem	Remote command settings					Initialize soc	:ket	
L r	Ship in	formatio	n —					Connect soc	:ket :F	
	Ship N	lame	IMO N	lumber	C	all Sign		 Disconnect s 	socket 🛛 🗤	
	Test 1234567 Test					_	Show messa	age		

Once selected the window **Remote computer settings** appears.

Remote computer settings					
IP address Port number	127 . 0 . 0 . 1 1991				
	OK Cancel				

Type the IP address of the remote computer, and insert the port number. Click **OK**.

The TSG Data Recorder will connect with this remote computer via socket.

Setup > Remote GPS data source > Initialize socket: Use this command to create, and to initiate the socket for connecting to server.

😸 SEAS TSG Data Recorder								
File	View	Setup	Tools H	lelp II	nfo		_	
		Tran	nsmission o	queue d	lirectory			
	Serial	Rea	ding calibr	ation co	oefficients	۲	e Davitu Stophite	
	v 0	Rem	iote GPS d	lata sou	urce	►	Computer settings	
		Rem	iote comm	and set	ttings		Initialize socket	
Г г	Ship information					_	Connect socket	
Ship Nam Test		lame	IMO Nu	ımber	Call Sign		✓ Disconnect socket Van	
			12345	67	Test		Show message	

Setup > Remote GPS data source > Connect socket: Use this command to connect the socket.

sEAS TSG Data Recorder								
File	View	Setup	Tools Help	Info)			
		Tran	ismission queu	e dire	ectory		1	
	Serial	Rea	ding calibratio	n coel	fficients	۲	e Pavity Stop hite	
	I 0	Rem	ote GPS data	sourc	e	Þ	Computer settings	H
		Rem	ote command	settir	ngs		Initialize socket	
	Ship information						 Connect socket 	thr
	Ship N	lame	IMO Numbe	r	Call Sign		Disconnect socket	٧a
Test			1234567	_	Test		Show message	ŀ
	Ship in Ship N Test	formatio Iame	n IMO Numbe 1234567	r	Call Sign Test		Connect socket Disconnect socket Show message	

Setup > Remote GPS data source > Disconnect socket: Use this command to disconnect the socket.

😸 SEAS TSG Data Recorder										
File	View	Setup	Tools H	Help Ir	nfo					
		Tran	smission	queue d	lirectory		1			
	Serial	Rea	ding calibr	ration co	pefficients	►	e Da	sritu	Stop bite	
		Rem	iote GPS d	data sou	urce	►	Comp	outer sett	ings	H
		Rem	iote comm	hand set	tings		Initia	lize socke	t	Ľ
. r	Ship information					 Connect socket 			thr	
	Ship N	lame	IMO N	umber	Call Sign		Disco	nnect soc	:ket	٧a
Test			1234	567	Test		Show	v message		ŀ

Setup > Remote GPS data source > Show message: Use this command to show the socket input.

TSC S	EAS T	'SG Dat	a Reco	order			
File	View	Setup	Tools	Help 1	Info		_
		Tran	smissior	n queue (directory		1
Serial		Rea	Reading calibration coefficients			۲	e Parity Stop bite
		Rem	ote GPS	data so	urce	►	Computer settings
		Rem	ote com	mand se	ttings		Initialize socket
	Ship information				Connect socket		
Ship Name Test		lame	IMO N	Number	Call Sign		✓ Disconnect socket
			123	4567	Test		Show message

Once selected the window **Remote computer message** appears.

Remote computer message
This application understands and expects a GPRMC sentence.
Socket input:
\$GPRMC,184720,A,3926.4029,N,10637.7565,W,30.0,53,031104,13,E*5F
Close

Setup > Remote command settings: Use this command to set the destination email address, which eventually get a diagnostic text message.



Once selected the window **Remote command settings** appears.

Remote command settings			
Iridium communication port COM Bits per second COM1 19200	Data bits Parity 8 None	Stop bits	Flow control
Destination email address Email address Caridad.i.gonzalez@noa	a.gov	ОК	Cancel

Type the destination email address. Click **OK**.

Tools > Zip and archive collected data: Use this command to put inside the zip folder all files generated with the collected data to archive.

1	😽 SEAS TSG Data Re	ecorder	
	File View Setup	Tools Help Info	
		Zip and archive collected data	
	-Serial port setup	Transmit data	
		Update calibration coefficients	
	Ship information Ship Name Horizon Naviç	Auto baud rate detection Communication test Set instruments default config Open folder containing archived data	, ici re di

Tools > Transmit data: Use this command to pack the

Xdata_CallSign_TSG_YYMMDDHHMMSS.txt file, and to put the zipped folder in to the Iridium Mailer Service's queue.

	🙀 SEAS TSG Data Recorder							
	File View Setup	Tools Help Info						
1		Zip and archive collected data						
	-Serial port setup	Transmit data						
		Update calibration coefficients						
	Ship information - Ship Name	Auto baud rate detection Communication test Set instruments default config	+					
		Open folder containing archived data						

Tools > Update calibration coefficients: This command reads, and updates the calibration coefficients.

ſ	😸 SEAS TSG Data Recorder							
	File View Setup	Tools Help Info						
ľ	-Serial port setup	Zip and archive collected data Transmit data						
		Update calibration coefficients		ľ				
-	Ship Information - Ship Name	Auto baud rate detection Communication test Set instruments default config	+	icii ne dr				
	Horizon Naviç	Open folder containing archived data						

The calibration coefficients can be read automatically from <u>SBE 45 MicroTSG</u>, and <u>SBE</u> <u>38 remote temperature sensor</u> when the application starts or when the user clicks the option **Automatic**. The read calibration coefficients process takes a while.

The calibration coefficients are very important metadata that have to be transmitted. If you use this command the dialog **SEAS TSG Data Recorder – Calibration Coefficients** comes up. If the **Reading calibration coefficients** selected option is **Automatic**, the dialog box shows the automatically read calibration coefficients of the instruments, and the user doesn't have access to some edit fields. Otherwise, if the selected option is **Manual** the user has to type the coefficients.

TSG unit group: Shows the calibration coefficients read automatically from the instruments. **Pipe length** and **Intake depth** correspond to the TSG physical architecture.

Intake depth represents how deep the intake of the TSG water into the ship is below sea level.

Pipe length is the length of pipe from water to TSG unit.

Fo is the frequency.

Remote sensor group: Shows the calibration coefficients read automatically from the instruments. **Intake depth** corresponds to the TSG physical architecture.

Intake depth represents how deep the intake of the TSG water into the ship is below sea level.

Pipe length is the length of pipe from water to remote sensor.

Button OK: Saves any metadata change into TsgDataRecorder.ini file.

Button Cancel: Ignores any change.

Tools > Auto baud rate detection: Use this command to change the baud rate in the <u>SBE 45 MicroTSG</u> and/or <u>SBE 38 remote temperature sensor</u> for compatibility with the <u>Interface Box</u>. This automatic detection is useful for establishing communication between the instruments.

	😸 SEAS TSG Data Re	corder		
	File View Setup	Tools Help Info		
	COM	Zip and archive collected data Transmit data Update calibration coefficients		F
	Ship information - Ship Name Horizon Naviç	Auto baud rate detection Communication test Set instruments default config	• •	ici ne d
		Open folder containing archived data		

Tools > Communication test > Interface Box: Use this command to test if the application is able to communicate with the <u>Interface Box</u>, and displays its configuration.

🙀 SEAS TSG Data Re	corder				
File View Setup	Tools Help Info				
Serial port setup	Zip and archive collected data Transmit data		Instrument Sampling interval		
	Update calibration coefficients		None SBE 45 No		
	Auto baud rate detection	Auto baud rate detection			
-Ship information -	Communication test	•	Interface Box		
Horizon Navic	Set instruments default config		SBE 45 MicroTSG		
	Open folder containing archived data		SBE 38 remote temperature sensor		

If the communication is established a screen with the current <u>Interface Box</u> configuration will appear.

SEAS TSG Data Recorder	×
Interface Box Configuration SBE 45 Junction Box V 2.0 SBE 45 baud rate = 4800 SBE 38 baud rate = 4800 NMEA baud rate = 4800 standard output format	

Tools > **Communication test** > **SBE 45 MicroTSG:** Use this command to test if the application is able to communicate with <u>SBE 45 MicroTSG</u> through <u>Interface Box</u>, and displays its configuration.

😸 SEAS TS	🙀 SEAS TSG Data Recorder								
File View	Setup	Тоо	ls Help Info						
Serial	Serial port setup COM V Dr COM4				uu control	Instrument	Sampling inter	val —	
			Update calibration coefficients				SBE 45 V	10 secs	ecs [
			Auto baud rate detection		É				
-Ship in	-Ship information -		Communication test	×		Interface	e Box		
Ship IV	Ship Name		Set instruments default config	×		SBE 45 N	/licroTSG		
Horiz	Horizon Navi <u>c</u>		Open folder containing archived data	SBE 38 remote temperature sensor		ire sensor			

If the communication is established a screen with the current <u>SBE 45 MicroTSG</u> configuration will appear.

SEAS TSG	Data Recorder	×
	SBE 45 MicroTSG Configuration SBE45 V 1.1a SERIAL NO. 0100 not logging data sample interval = 1 seconds output conductivity with each sample output salinity with each sample output sound velocity (Chen-Millero) with each sample start sampling when power on do not power off after taking a single sample do not power off after two minutes of inactivity A/D cycles to average = 4	

Tools > Communication test > SBE 38 remote temperature sensor: Use this command to test if the application is able to communicate with <u>SBE 38 remote</u> temperature sensor through Interface Box, and displays the configuration.

File View Setup				_
Serial port setup COM COM Ship information - Ship Name	Tools Help Into Zip and archive collected data Transmit data Update calibration coefficients Auto baud rate detection Communication test Set instruments default config	•	Flow control	ecs
THOMEON THE VIE	Open folder containing archived data		SBE 38 remote temperature sensor	

If the communication is established a screen with the current <u>SBE 38 remote temperature</u> <u>sensor</u> configuration will appear.

SEAS TSG	Data Recorder	×
i	SBE 38 remote temperature sensor Configuration SBE 38 V 1.2 S/N = 00183 navg = 2 not sampling data automatically start sampling on power up default interface is RS-232 OK	

Tools > Set instruments default config > Interface Box: Use this command to read from .INI file the <u>Interface Box</u>'s default configuration setup, and sets them appropriately.

🙀 SEAS TSG Data Reco	🙀 SEAS TSG Data Recorder						
File View Setup T	ools Help Info						
Serial port setup	Zip and archive collected data Transmit data Update calibration coefficients Auto baud rate detection Communication test		Instrument Sampling interval				
			None V SBE 45 V 10 secs				
-Ship information -			cian information				
	Set instruments default config	•	Interface Box				
Horizon Navig Open folder containing archived data			SBE 45 MicroTSG				
Parsed TSG data ready to archive			soe so remote temperatute sensor				

Tools > Set instruments default config > SBE 45 MicroTSG: Use this command to read from .INI file the <u>SBE 45 MicroTSG</u> 's default setup, and sets them appropriately.

🙀 SEAS TSG Data Re	🙀 SEAS TSG Data Recorder					
File View Setup	Tools Help Info					
Serial port setup	Zip and archive collected data Transmit data		Flow control	-Instrument	-Sampling interval	
	Update calibration coefficients	None SBE 45		10 secs		
-Ship information -	Auto baud rate detection Communication test Set instruments default config		cian information			
Ship Name			Interface Box		H	
Horizon Navic Open folder containing archived data			SBE 45 M	licroTSG	ite sensor	
Parsed TSG data	ready to archive	_	550 50 10	more remperate		

Tools > Set instruments default config > SBE 38 remote temperature sensor: Use this command to read from .INI file the <u>SBE 38 remote temperature sensor</u>'s default setup, and sets them appropriately.

🙀 SEAS TSG Data Reco	🙀 SEAS TSG Data Recorder						
File View Setup T	ools Help Info		_				
Serial port setup	Zip and archive collected data Transmit data		Instrument Sam	pling interval —			
	Update calibration coefficients		None V SBE 45 V 10	secs			
-Ship information -	Auto baud rate detection Communication test		cian information				
Horizon Navir	Set instruments default config	•	Interface Box				
Tionzon Havig	Open folder containing archived data		SBE 45 MicroTSG	or			
Parsed TSG data rea	ady to archive		obe bo remote temperature sen.				

Tools > Open folder containing archived data: Use this command to display in Windows explorer the folder where the data are archived.

TS	SEAS TSG Data Recorder							
F	File View Setup	Tools Help Info						
	-Serial port setup	Zip and archive collected data Transmit data						
		Update calibration coefficients						
	Ship information - Ship Name Horizon Navic	Auto baud rate detection Communication test Set instruments default config						
	1	Open folder containing archived data						

Help > Help topics: Use this command to display the opening screen of help. From the opening screen, you can jump to step-by-step instructions for using SEAS TSG Data Recorder and various types of reference information.

😸 SEAS TSG Data Recorder							
<u>File View S</u> etup <u>T</u> ools	<u>H</u> elp	Info					
	He	lp Topics					
Serial port setup COM	Ab	out SEAS TSG Data Recorder d Data Dits Parity S					

Help > About SEAS TSG Data Recorder: Use this command to display the copyright notice and version number of your copy of SEAS TSG Data Recorder.

😸 SEAS TSG Data Recorder							
<u>File View Setup Tools Help</u> Info							
		He	lp Topics				
	-Serial port setup	Ab	out SEAS TSG Data Recorder				
COM '		secon	id Data bits Parity SI				

Info: This menu provides you links to documents that can help you work with SEAS TSG Data Recorder.

1	😴 SE	AS TSG	i Data Re	corder	-	
	File	View	Setup	Tools	Help	Info
		Serial o	ortsetun			SEAS TSG Data Recorder User Guide (pdf)

Auto baud rate detection

To achieve effective communication between the instruments, the baud rate for communication between the <u>Interface Box</u> and the computer must be greater than the baud rate between the <u>Interface Box</u> and the <u>SBE 45 MicroTSG</u>, and the baud rate between the <u>Interface Box</u> and the <u>SBE 38 remote temperature sensor</u>. The **Auto baud rate detection** feature allows changing the baud rate in the <u>SBE 45 MicroTSG</u> and/or <u>SBE 38 remote temperature sensor</u> for compatibility with the Interface Box.

By default AOML set follow configuration:

Communicated instruments	Baud rate			
Interface Box - Computer	9600			
Interface Box – SBE 45	4800			
Interface Box – SBE 38	4800			
Interface Box – NMEA navigation device	4800			

This automatic detection is useful for establishing communication between the instruments. Once the communication between the instruments has been established a report will be generated.

SEAS TSG Data Recorder						
(i)	Auto baud rate detection report:					
~	Interface Box - PC baud rate = 9600 Interface Box - SBE45 baud rate = 4800 Interface Box - SBE38 baud rate = 4800					
	OK					

Detection technique

To determine the baud rate of the instruments a command will be sent, and the response will be examined. If it doesn't match with the expected response then the baud rate will be changed until we get an expected answer.

Communicated instruments	Baud rate range
Interface Box - Computer	4800, 9600 or 19200
Interface Box – SBE 45	1200, 2400, 4800 or 9600
Interface Box – SBE 38	1200, 2400, 4800 or 9600
Interface Box – NMEA navigation device	4800 or 9600

Exchange algorithm

The exchange algorithm is to change the baud rate while the instrument is communicating through the <u>Interface Box</u>. The procedure is assuming that we want the computer to communicate with the <u>Interface Box</u> at 9600 baud, and the other instruments with the <u>Interface Box</u> at 4800 baud.

1. Establish communication with the <u>Interface Box</u> using the detection technique.



- 2. With the <u>Interface Box</u> in Normal mode, send **PCBaud=19200** to change the baud rate between the <u>Interface Box</u> and the computer to 19200.
- 3. Set the computer serial port's baud rate to 19200.
- 4. Modify the <u>SBE 45 MicroTSG</u> baud rate:
 - A. Send **45Baud=9600** to set the baud rate in the <u>Interface Box</u> for communication with the <u>SBE 45 MicroTSG</u> to 9600.
 - B. Send Connect45 to communicate with the <u>SBE 45 MicroTSG</u>.
 - C. Stop sampling by sending **Stop** (it may need to send the command several times).
 - D. Send **Baud=4800** to set the <u>SBE 45 MicroTSG</u> baud rate to 4800.
 - E. Send @ to return to the <u>Interface Box</u>.
 - F. Send **45Baud=4800** to set the baud rate in the <u>Interface Box</u> for communication with the <u>SBE 45 MicroTSG</u> to 4800.
- 5. Modify the <u>SBE 38 remote temperature sensor</u> baud rate:
 - A. Send **38Baud=9600** to set the baud rate in the <u>Interface Box</u> for communication with the <u>SBE 38 remote temperature sensor</u> to 9600.
 - B. Send **Connect38** to communicate with the <u>SBE 38 remote temperature</u> <u>sensor</u>.
 - C. Stop sampling by sending **Stop** (it may need to send the command several times).

- D. Send **Baud=4800** to set the <u>SBE 38 remote temperature sensor</u> baud rate to 4800.
- E. Send @ to return to the <u>Interface Box</u>.
- F. Send **38Baud=4800** to set the baud rate in the <u>Interface Box</u> for communication with the <u>SBE 38 remote temperature sensor</u> to 4800.
- 6. Send **PCBaud=9600** to change the baud rate between the <u>Interface Box</u> and the computer to 9600.
- 7. Set the computer serial port's baud rate to 9600. The <u>Interface Box</u> is now communicating with the computer at 9600 baud.

Setting instruments default setup

The data output format depends on the instruments' configuration. The command's values will be loaded from the .INI file.

Command Value		Description			
Format	0	Standard format.			
PCBaud	9600	Baud rate for communication between Interface Box and computer.			
45Baud	4800	Baud rate for communication between Interface Box and SBE 45.			
38Baud	4800	Baud rate for communication between Interface Box and SBE 38.			
NMEABaud	4800	Baud rate for communication between Interface Box and NMEA unit.			

Commands to setup the <u>Interface Box</u>'s parameters.

Commands to setup the <u>SBE 45 MicroTSG</u>'s parameters.

Command	Value	Description	
Interval	1	Interval (seconds) between samples.	
OutputCond	Y	Output conductivity (S/m) with data.	
OutputSal	Y	Output salinity (psu) with data.	
OutptSV	Y	Output sound velocity (m/sec) with data.	
SVAlgorithm	С	Calculate sound velocity as Chen and Millero.	
AutoRun	Y	Start sampling automatically when power on.	
SingleSample	Ν	Sample at rate specified by Interval = until power removed.	
AutoOff	Ν	Do not automatically go to sleep.	
NCycles	4	A/D cycles to average per sample.	
Baud	4800	Baud rate communication between SBE 45 and Interface Box.	
OutputFormat	0 or 1	Other format is not compatible with the Interface Box.	

Command	Value	Description
Interface	232	Communication using RS-232.
Navg	2	Number of A/D cycles to average for each sample.
AutoRun	Y	Start sampling automatically when power on.
Format	С	°C, ITS-90.
Digits	4	Number if digits after decimal point.
Baud	4800	Baud rate communication between SBE 38 and Interface Box.

Commands to setup the <u>SBE 38 remote temperature sensor</u>'s parameter.

Archiving data

The <u>NOAA</u> National Oceanographic Data Center (<u>NODC</u>) preserves and disseminates ocean data, including TSG data, in their Ocean Archive System (<u>OAS</u>); it allows the oceanographic community to use these data for a long time.

The generated TSG data files contain the meta-data at the top, and the TSG data bellow.

Designator	Parameter	Unit		
WMOID	Ship Call Sign			
SHIPN	Ship name			
IMONO	Ship IMO number			
TEC	Technician name			
TECM	Technician email address			
TECP	Technician phone			
TECA	Alternate technician name			
TECAM	Alternate technician email address			
TECAP	Alternate technician phone			
TSGMOD	TSG unit model			
TSGSN	TSG unit serial number			
IDP	TSG unit intake depth	meter		
ILEN	Length of pipe from water to TSG unit	meter		
DCAL	TSG unit calibration date			
COTG	TSG unit temperature coefficient A0			
СОТН	TSG unit temperature coefficient A1			
COTI	TSG unit temperature coefficient A2			
COTJ	TSG unit temperature coefficient A3			
COCG	TSG unit conductivity coefficient G			
COCH	TSG unit conductivity coefficient H			
COCI	TSG unit conductivity coefficient I			
COCJ	TSG unit conductivity coefficient J			
COCPR	TSG unit conductivity coefficient Cpcor			
COCTR	TSG unit conductivity coefficient Ctcor			
COCWB	TSG unit conductivity coefficient Wbotc			
EXTMOD	Remote sensor model			
EXTSN	Remote sensor serial number			
EXTDCAL	Remote sensor calibration date			
EXTTD	Remote sensor intake depth	meter		
EXTTL	Remote sensor length of pipe	meter		
COA0	Remote sensor temperature coefficient A0			
COA1	Remote sensor temperature coefficient A1			
COA2	Remote sensor temperature coefficient A2			

The **\$AOML:001** section corresponds to the meta-data.

COA3	Remote sensor temperature coefficient A3	
00113		

Parameter Unit Designator YMD PC date: Year Month Day UTC PC time: Hour Minute Second HMS UTC LAT **GPS** Latitude degree (+N, -S)LON GPS Longitude degree (+E, -W)INT TSG unit temperature* °C, ITS-90 TSG unit salinity* SAL **PSU** COND TSG unit conductivity* siemens/meter Remote sensor temperature EXT °C. ITS-90

The **\$AOML:002** section corresponds to the TSG data.

* All samples are instantaneous. No averaging.

TSG data is time and position stamped with time and position data from satellites and this is the data that is archived. This format is compatible with data coming from other TSG server on the <u>NOAA</u> ships, which do not use our application for TSG acquisition data.

Data collection

SEAS TSG Data Recorder application archives the collected TSG data in a text file in the ...**Archive****TsgDataRecorder****SrvArchv** directory. The data are recorded at the speed of the **Collection-sampling interval** field.

🕞 TEST_20120912155123_Sdata_TSG.txt - Notepad
Elle Edit Format View Help
\$A0ML:001, WM0ID:TEST, SHIPN:TEST, IMONO:1234567, TSGMOD:SBE45, TSGSN:0073, IDP:1.20, ILEN:0.35, DCAL:08-may-07, COTG:-6.06 🔼
3892e-06,COTH:2.783052e-04,COTI:-2.645087e-06,COTJ:1.581528e-07,COCG:-9.776560e-01,COCH:1.440116e-01,COCI:-1.16545
9e-04,CoCJ:3.229662e-05,CoCPR:-9.570000e-08,CoCTR:3.250000e-06,CoCWB:1.077696e-05,CoA0:-1.335250e-05,CoA1:2.763461 📃
e-04,COA2:-2.415561e-06,COA3:1.561423e-07,EXTMOD:SBE38,EXTSN:00180,EXTDCAL:11-jun-08,EXTTD:1.28,EXTTL:2.17
\$AOML:002,YMD:20120912,HMS:032115,LAT:37.8870,LON:-123.1393,INT:23.4282,SAL:37.1085,COND:5.41790,EXT:23.71
\$AOML:002,YMD:20120912,HMS:032125,LAT:37.8872,LON:-123.1403,INT:23.4281,SAL:37.1086,COND:5.41790,EXT:23.7205
\$AOML:002,YMD:20120912,HMS:032135,LAT:37.8875,LON:-123.1413,INT:23.4282,SAL:37.1088,COND:5.41793,EXT:23.7238
\$AOML:002,YMD:20120912,HMS:032145,LAT:37.8877,LON:-123.1427,INT:23.4292,SAL:37.1083,COND:5.41797,EXT:23.7314
\$AOML:002,YMD:20120912,HMS:032155,LAT:37.8880,LON:-123.1437,INT:23.4294,SAL:37.1088,COND:5.41805,EXT:23.7364
\$AOML:002,YMD:20120912,HMS:032205,LAT:37.8883,LON:-123.1447,INT:23.4299,SAL:37.1086,COND:5.41809,EXT:23.7434
\$AOML:002,YMD:20120912,HMS:032215,LAT:37.8888,LON:-123.1460,INT:23.4303,SAL:37.1088,COND:5.41816,EXT:23.7408
\$AOML:002,YMD:20120912,HMS:032225,LAT:37.8892,LON:-123.1470,INT:23.4312,SAL:37.1085,COND:5.41822,EXT:23.7415
\$AOML:002,YMD:20120912,HMS:032235,LAT:37.8895,LON:-123.1478,INT:23.4316,SAL:37.1089,COND:5.41832,EXT:23.7453

The file name TEST_20120912155123_Sdata_TSG.txt stands for:

TEST	= Ship call sign
20120912155123	= generation time, format: YYYYMMDDHHMMSS
Sdata	= fixed text to distinguish collected data
TSG	= fixed text

The generated file will be zipped at 12:00 am every day, when the user selects **Main Menu > Tools > Zip and archive collected data** option or when the application exits.

😂 C: Wocuments and Settings 🗛 III Users Application Data 🗛 WERSEAS_V9 Archive \TsgDataRecorder \SrvAr											
<u> E</u> ile <u>E</u> dit <u>V</u> iew F <u>a</u> vorites <u>I</u> ools <u>H</u> elp					G Back	• »	A <u>d</u> dress	7			
Folders	×	Name 🔺	Size	Туре		Date	Modified				
Folders × Folders × AMVERSEAS_V9 Archive ArchiveReporter ArchiveMet SeasTransceiverInterface TsgDataRecorder XmtArchv XmtA		S_Log.txt TEST_20120912200123_Sdata_TSG.zip	1 KB 1 KB	Text Docur Compresse	ment ad (zippe	9/12/2 9/12/2	2012 8:01 F	PM PM			

The zipped files are taken off the ship by a technician every few months or as scheduled. Its name has typically following format: CallSign_YYYYMMDDHHMMSS _Sdata_TSG.zip where:

= Ship call sign
= generation time
= fixed text to distinguish collected data
= fixed text

The **S_Log.txt** file into the same directory contains information about the zipped archive files. It is used to keep track of when zipped files are created and what was inside of it.



Where

= Zipfolder name, path included
= Date the zipfolder was created
= The name of archived file into zipfolder
= The length of the archived file, in bytes
= The last time the archived file was changed

Data transmission

The ready collected data to be transmitted will be recorded into\Archive\TsgDataRecorder\XmtArchv directory at the speed of the Transmission-sampling interval field.

These files have the same format as the collected data files; the data could be equal to the collected data or a sampling subset. For example the sampling of the data collected maybe is 10 seconds, and the sampling of the data ready to transmit maybe is 60 seconds. This feature allows reduce the transmission costs by reducing the size of the files to transmit.

TEST_20120912155123_Xdata_TSG.txt - Notepad	
Elle Edit Format View Help	
\$AOML:001, WMOID:TEST, SHIPN:TEST, IMONO:1234567, TSGMOD:SBE45, TSGSN:0073, IDP:1.20, ILEN:0.35, DCAL:08-may-07, COT(3:-6. 🔼
063892e-06,COTH:2.783052e-04,COTI:-2.645087e-06,COTJ:1.581528e-07,COCG:-9.776560e-01,COCH:1.440116e-01,COCI	:-1.1 📃
65459e-04,COCJ:3.229662e-05,COCPR:-9.570000e-08,COCTR:3.250000e-06,COCWB:1.077696e-05,COA0:-1.335250e-05,COA	A1:2.
763461e-04,COA2:-2.415561e-06,COA3:1.561423e-07,EXTMOD:SBE38,EXTSN:00180,EXTDCAL:11-jun-08,EXTTD:1.28,EXTTL	:2.17
\$AOML:002,YMD:20120912,HMS:032115,LAT:37.8870,LON:-123.1393,INT:23.4282,SAL:37.1085,COND:5.41790,EXT:23.71	
\$AOML:002,YMD:20120912,HMS:032215,LAT:37.8888,LON:-123.1460,INT:23.4303,SAL:37.1088,COND:5.41816,EXT:23.7408	3
\$AOML:002,YMD:20030914,HMS:032315,LAT:37.8905,LON:-123.1508,INT:23.4338,SAL:37.1087,COND:5.41853,EXT:23.693	э
\$AOML:002,YMD:20030914,HMS:032415,LAT:37.8933,LON:-123.1588,INT:23.4368,SAL:37.1090,COND:5.41890,EXT:23.688	3
\$AOML:002,YMD:20030914,HMS:032515,LAT:37.8960,LON:-123.1648,INT:23.4400,SAL:37.1089,COND:5.41923,EXT:23.700	7
	~

The file name TEST _20120912155123_Xdata_TSG .txt stands for:

TEST	= Ship call sign
20120912155123	= generation time, format: YYYYMMDDHHMMSS
Xdata	= fixed text to distinguish transmitted data
TSG	= fixed text

The generated file to transmit TSG data will be zipped at the user selected time to zip and transmit data in **Transmission interval** fields, when the user selects **Main Menu > Tools** > **Transmit data** option or when the application exits.

🔄 C:\Documents and Settings\All Users\Applicatio	ata\AMVERSEAS_V9\Archive\TsgData	Recorder\XmtAr
<u>File E</u> dit <u>V</u> iew F <u>a</u> vorites <u>T</u> ools <u>H</u> elp		G Back 🗸 👋 Address 🧦
Folders	Name 🔺	
AMVERSEA5_V9 AnverReporter Archive ArchiveMet SeasTransceiverInterface SrvArchiv SrvArchiv XmtArchiv XmtArchiv XmtArchiv XmtArchiv XmtArchiv	TEST_20120912200123_Xdata_TSG.zip	
<	<	

Its name has typically following format: CallSign_YYMMDDHHMMSS_Xdata_TSG.zip where:

CallSign	= Ship call sign
YYYYMMDDHHMM	ASS = generation time
Xdata	= fixed text to distinguish transmitted data
TSG	= fixed text

The **X_Log.txt** file into the same directory contains information about the zipped archive files. It is used to keep track of when zipped files are created and what was inside of it.



Where

Zipfolder Date	Zipfolder name, path includeddate the zipfolder was created
Filename	= The name of archived file into zipfolder
Size	= The length of the archived file, in bytes
Date	= The last time the archived file was changed

Transmission process

The transmission process in SEAS TSG Data Recorder application is a pseudo transmission process. It consists to copy the CallSign_YYYYMMDDHHMMSS_Xdata_TSG.zip file from ...\Archive\TsgDataRecorder\XmtArchv directory to the Iridium's queue for the real transmission via satellite using the Iridium Mailer Service. When the remission is completed, it is logged in the transmission log file.

The transmission log file **Xmit_Log.txt** contains information about when the file was sent to Iridium Mailer Service's queue. This is written after the data is sent to Iridium's queue, and is a safeguard to insure status of files sent to this directory.



Where

Folder	= File sent to Iridium Mailer Service's queue
Date	= Remission date

Note: When a file has been successfully transmitted, the Iridium Mailer Service deletes the file from the queue and proceeds to transmit the next file if any.

.INI file

TsgDataRecorder.ini is a plain-text file that contains configuration information. This file is used by SEAS TSG Data Recorder to save information about the application setup, and preferences. "INI" stands for *initialization* (.INI File, More abstraction using text between programs, not within programs.doc). The file has to be in the same directory where the application runs.