

# Southstar Operation Guide

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## 1. Intro

Thank you for your purchase of the Southstar Acoustic Tracking System. This guide describes the Southstar Interface program, as well as gives instructions for using your Southstar Acoustic Tracking System.

## 2. Component List

- 1 Copy of Southstar Interface
- 1 Copy of Divebase

## 3. Hardware Deployment

Refer to the Hardware Setup Guide.



## 4. Southstar Interface

### 4.1 Core Interface

The Southstar Interface UI is separated into 4 logically separated areas:

- (1) Activity Buttons
- (2) System Configuration
- (3) the At-A-Glance Station Status Area
- The (4) Baseline Station Display Area
- (5) the Mobile Station Display Area.

The screenshot shows the SouthStar V1.3 interface with the following sections:

- Navigation:** Noise Test, Comms, Baseline Survey, Offset Adjust, Show Station Coms, Wakeup Stations
- Configuration:** Depth (m) 0, Drift (m/S) 0.00, Offset(s) 10000, Sound speed m/S 1440, Target Dist. from B1 (m)
- Mobile Station Distances:** B1 (m) 2.69, B2 (m) 2.37, B3 (m) 2.87, B4 (m) 2.32
- Baseline Status:** Four green indicator lights.
- Base Stations:** A list of four stations (4000, 4002, 4001, 4003) with corresponding status bars.
- Mobile Stations Table:**

ID	Enabled	Primary	B1(m)	B2(m)	B3(m)	B4(m)	Depth(m)	Tilt(y)	Tilt(x)	Temp(c)	Description
100	<input checked="" type="checkbox"/>	*	2.69	2.37	2.87	2.32	0.00	0	0	19.10	Target

The Station Display Area and the Mobile Station Display Area are not shown by default, and can be shown or hidden by pressing the button marked with an arrow next to the corresponding header.

## 4.2 Activity Button Area



1. Noise Test: Puts the Station Array into Noise Test Mode.
2. Coms: Accesses Communication Settings.
3. Baseline Survey: Begins the Baseline Survey Process.
4. Offset Adjust: Sets offset.
5. Show Station Coms: Shows the Raw Communication between the station array and Command Station.
6. Wakeup Stations: Wakes the station array from sleep mode.

## 4.3 Configuration Area



Depth: Depth display. Depth is received automatically from PC-PILOT and shown in this field. You can also hand-enter depth if automatic depth should fail.

1. Drift (m/S): Enter the pinger clock drift relative to the GPS standard based on an observation; to minimize position drift.
2. Offset (uS): Response Time of the TLT + Radio Communication. (10060 typ.)
3. Sound Speed: (m/S): The speed of sound in the operating environment, i.e. saltwater or freshwater
4. Target Distance form B1 (m): Set this when calibrating offset.

## 4.4 At-A-Glance Station Status Area



The At-A-Glance Station Status Area gives you quick reference to the status of your stations at any time. Each station is represented by a colored indicator. These indicators are displayed in the same

order as they are listed in the Baseline Station Display Area. The color of each indicator represents the corresponding stations status:

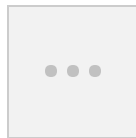
- **Green:** Station is OK; Radio Communication is working, Station is tracking.
- **Yellow:** Station is OK; Radio Communication is working, Station has not received any acoustic signals.
- **Red:** Station is faulted; Radio Communication may not be working.

The station Indicators may flash from green to yellow or red occasionally due to momentary signal loss, this is normal. If there is an actual error, the offending station(s) indicator(s) color will remain for an extended period of time. Check Troubleshooting for steps to resolve these issues.

The At-A-Glance Station Status Area also includes the last reported distance to the mobile station. These numbers may normally fluctuate several centimeters, and may occasionally show numbers close to the speed of sound in your operating environment, this represents acoustic signal loss. Frequent loss of acoustic signal may represent a number of different problems. Consult Troubleshooting to resolve them.

## 4.5 Base Station Display Area

The Base Station Display Area provides a more detailed description of each station, as well as some ability to configure the station.



Each station has its own display bar.



This bar is composed of several parts:

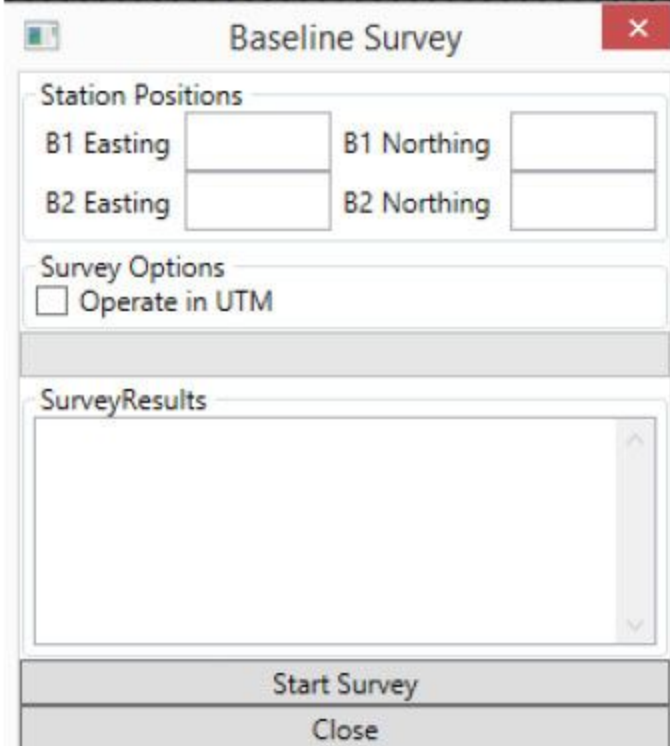
1. An ID Indicator.
2. A Noise Test Bar
3. A Slider

During Setup, you may double click the ID Indicator and input the ID of your TLT-32A Device. You must commit the change by pressing "Enter". The ID's must correspond to specific positions in your array.

Consult section 5.8 for further information.

During a Noise Test, the Noise Test Bar will change in accordance with the amount of ambient noise the station is currently experiencing. During this time, you may adjust the slider to set the acoustic sensitivity of the corresponding station. You must end the noise test to commit the changes and resume tracking.

## 4.6 Baseline Survey



Baseline Survey			
Station Positions			
B1 Easting	<input type="text"/>	B1 Northing	<input type="text"/>
B2 Easting	<input type="text"/>	B2 Northing	<input type="text"/>
Survey Options			
<input type="checkbox"/> Operate in UTM			
SurveyResults			
<input type="text"/>			
Start Survey			
Close			

The Baseline Survey Window allows you to run Baseline Surveys on your station array, a process which locates your stations relative to the first and second station in the Station Display Area. Fill boxes B1, B2, B3, and B4 in with "0's" and press the Start Survey button.

### **Survey Options:**

Operate in UTM: Use only if you are fluent with the UTM coordinate system.

A Survey Result appears in the Survey Results box after a Baseline Survey is complete. This information is separated into 3 parts.

### **General Results:**

If the survey has completed successfully, the first line of the Survey result will reflect this, as well as how many stations were positioned during the survey. If the survey did not complete successfully, this line will read "Survey Failed".

### **Inter-Station Measurements:**

These are lines in the format:

**B(X)-B(Y): (D)meters; Precision: (P)m**

Where X and Y are Base Station Labels, D is the distance from BX to BY, and (P)recision is the quality of that distance, with "0" being the highest quality possible. This information is invaluable in troubleshooting.

### **Station Positions:**

These are lines in the format:

**B(X): E=(Xpos) N=(Ypos)**

Where X is a Base Station Label.

If Operating in UTM, XPos and YPos are the UTM coordinates of the corresponding station. If not operating in UTM, XPos and YPos are Cartesian offsets from B1.

## **4.7 Noise Test**

The Noise Test functionality of the South star system is an essential part of system calibration. During a Noise Test, the mobile station will be turned off, and the remaining stations will begin reading the ambient noise. The colored bars on each Station Display will indicate the ambient sound level at each station. You may then compensate for high noise conditions by setting each stations Detection Threshold using the sliders. To commit your changes and resume tracking, press the "Noise Test" button again. For more information, refer to Section 5.5

## **4.8 Station Configuration**

### **Station Sensitivity**

Each stations acoustic sensitivity may be changed by raising or lowering its detection threshold. High detection thresholds are better for noisy environments, but may not catch every ping if set too high. Low detection thresholds are more desirable in general, but in a noisy environment will cause "false" pings to show up. Setting the Detection Threshold requires the system to be in Noise Test mode.

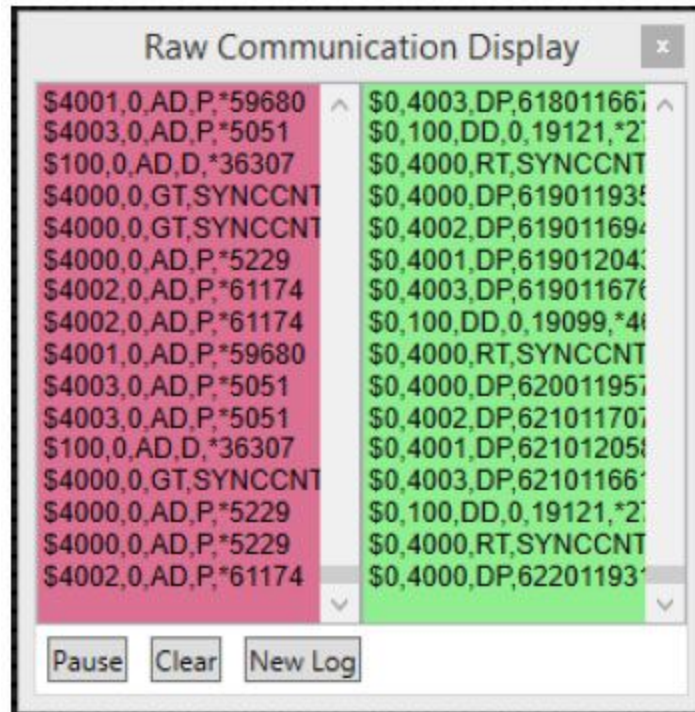
## 4.9 System Configuration

### Configuration File

The configuration file contains information regarding the configuration of your Southstar setup, including number of stations, system configuration, and setup. However, editing this file incorrectly may cause any number of errors, including system malfunction and software crashes. Therefore it is inadvisable to edit this file yourself. It is recommended that you contact Desert Star Systems if you require changes to this file. (Do not edit this file without explicit instructions and or permission from Desertstar Systems, doing so may void service and or product warranties.)

[Engineering@Desertstar.com](mailto:Engineering@Desertstar.com)

## 4.10 Raw Communications



The Raw Communications window allows direct viewing and access to the serial communications link. The "Pause" button will pause the displays scroll bar, though new data will still be recorded. The Clear button will clear the currently displayed information. The "New Log" Button will start a new communications log with the current date and time.

## 4.11 Communication Configuration

## **4.12 System Sleep**

The Station Array will go to sleep after 5 minutes of no radio communication. If you wish put the system to sleep, simply close the Southstar Interface program and wait 5 minutes. To wake the system from sleep, open the Southstar Interface program and press the “Wakeup Stations” button. This will cause all sleeping stations to exit sleep mode, this may take up to 63 seconds.

## **5. Quick Start**

### **5.1. Start Southstar Interface**

Start the Southstar software.

### **5.2. Start Divebase**

Start the Divebase software.

### **5.3. Station Array Port Selection**

Press the “Coms” button. Select the port you wish to use to communicate with the Station Array. This should be the port your Radio Transponder is attached to.

### **5.4 Divebase Port Selection**

Press the “Coms” button. Select the port you wish to use to communicate with DiveBase. This should be one side of your virtual Serial Port Pair.

### **5.5 Southstar Interface Port Selection**

In Divebase, In the “Options→Acoustic Navigation Port” menu, select the other side of your virtual serial port pair that you chose for step 2.

### **5.6 Southstar Interface Baseline Survey**

In the Southstar Interface program, press the “Baseline Survey” button. If you are using UTM Coordinates, check the “Operate in UTM” checkbox and input the UTM coordinates for the first and second stations. If you are not using UTM, leave the “Operate in UTM” checkbox unchecked and enter zero’s into every text box in the “Station Positions” section.

Click the “Start Survey” button.



Record the data listed in the “Survey Results” box (You may have to scroll). This data may be copied and pasted into a text file for your convenience.

Repeat this process several times, recording the results each time. Use the survey with the best precision. If, after running several baseline surveys, you have stations with unacceptable precision, you may need to move on to troubleshooting.

## 5.7 Divebase Station Setup

Select “Action→Register and Calibrate Baseline Stations” to bring up the array configuration window. Enter the station positions gathered from step 4. Click “Apply” and then “OK”

Note if the TLT units have failed to report base station depth correctly it must be configured manually here.

## 5.8 Tracking

Tune the settings in the “System Configuration” settings to reflect your operating environment. In the Station Display Area, change the station ID to reflect the IDs of your actual system. Instructions for this are in section 4.2.1.4.

The order of the listed baseline stations in the “Station Display” area correspond to the geometry of your array in the following manner:

- The first listed station must correspond to the Bottom Left corner of your array (B1).
- The Second listed station must correspond to the Top Right corner of your array (B2).
- The third listed station must correspond to the Bottom Right corner of your array (B3).
- The fourth listed station must correspond to the Top Left Corner of your array (B4).

Failure to assign baseline stations to the correct position will result in an unusably distorted baseline survey.

If you do not have the required number of baseline stations listed, please email Desert Star Systems at [Engineering@Desertstar.com](mailto:Engineering@Desertstar.com)

Run a “Noise Test” and set each stations detection threshold (Refer to section 4.7).

Press the “Wakeup” button to start tracking. In Divebase, select Actions→Start Real Time Tracking (See Divebase manual for complete instructions.)

After a minute, if you have an active pinger in the water and within range, all stations (including the mobile station) should turn green. You should begin receiving distance data from the baseline stations, which will be reflected in the “At A Glance Station Status” section and the Station Display

for the Mobile Station. This data will be transmitted through the selected serial port to Divebase, which will calculate and display the position of the mobile station.

Refer to the Divebase manual for Divebase operation.

## 6. Troubleshooting

Issue: A Baseline Station reports "0" distance to a Mobile Station.

### **Causes:**

1. The Baseline station has not received a ping from the mobile station. 2. The Baseline station is not set to receive pings. Solutions: 1. Check that the data cables are securely attached.
2. Contact [Engineering2Desertstar.com](http://Engineering2Desertstar.com)

### **Issue:**

A Baseline Station reports a value very close to the speed of sound.

### **Causes:**

- The current environment has many reflections.

### **Solutions:**

- Adjust Detection Threshold for each station to compensate for the additional noise.

### **Issue:**

A Baseline Station Indicator Turns Solid Red for over 3 seconds, and its distance from the Mobile Station does not update.

### **Causes:**

1. The Baseline Station has lost radio communication...
  1. because the cable is damaged.
  2. because the FRF has a dead or low battery.
  3. because there is poor line of sight from the radio communications dongle to the Baseline Station.
  4. because there is a very noisy radio environment.
  5. because the TLT is damaged.
  6. because the Base Station is asleep.

### **Solutions:**

1. Inspect cable. Replace if damaged.
2. Recharge the FRF. Note that if one station needs charging, they should all be charged simultaneously.
3. Move the Radio Communications Dongles antennae to a position with clear line of sight to all stations
4. Move Radio Communications Dongle and antennae away from other electronic equipment such as power supplies, monitors, and chargers.
5. Replace TLT with a known functional device.
6. Press the "Wakeup Stations" button in the Southstar Interface.

### **Issues:**

A Single Baseline Station fails to update its distance for an extended period of time.

### **Causes:**

1. The Baseline Station has lost Acoustic Signal Contact with the Mobile Station.
  1. The acoustic Signal is being blocked by a physical object.
  2. The acoustic Signal is too weak to be detected.

### **Solutions:**

1. Move the Baseline Station to a location that has uninterrupted line of sight of the entire survey area.
2. If the Mobile station is far away from the Baseline Station, move the mobile station back into the Baseline Stations Acoustic range.

**Note:** Southstar is able to operate with three instead of four Baseline Stations, though it is not recommended for normal operation.

### **Issue:**

All Baseline Stations fail to update for an extended period of time.

### **Causes:**

1. The Mobile Station is not within range.
2. The Mobile Station is malfunctioning.

## **Solutions:**

1. Move the Mobile Station within range of at least three Baseline Stations.
2. Check the Mobile Station for pinging by placing pinger on or near ear. Note that Mobile Station pinging will not be enabled during a noise test or Wakeup period.

# **7. Appendices**

## **7.1 Terms**

Command Station: PC Running Southstar Software.

Pinger: The mobile station attached to the ROV. A TLT-32A device.

Ping: Acoustic signal sent or received from one of the TLT-32A devices.

Base Station: The TLT-32A , FRF-2, Buoy and Tripod combo setups deployments marking part the survey array.

TLT-32A: Device capable of sending or receiving acoustic signals.

FRF-2: The RF communication modem connected to a TLT-32A.

Buoy: Keeps the FRF-2 afloat at the surface of the water.

Tripod: Holds the TLT-32A steady at the seafloor while tethering the buoy/FRF-2 in the array.