Dsubs engineering demo manual

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System requirements

Dsubs demo binary release is tested on Windows7 and Windows10. It is compiled as 32bit application.
Visual C++ Redistributable for Visual Studio 2015 (x86 version) must be installed on fresh old systems like Windows7:
https://www.microsoft.com/en-US/download/details.aspx?id=48145

Application needs a hardware graphics acceleration that supports OpenGL 2.0 profile.
Outbound TCP connections to port 17955 must be allowed by your infrastructure to connect to the game server.

Installing and running

Latest binary release can be downloaded from:

https://github.com/Boris-Barboris/dsubs_demo/releases

Download the “dsubs-win-x86.zip” archive from the release’s “Assets” to your machine. Unpack it to your preferred game directory. Internal “dsubs” folder contains all game files. Run “dsubs_client” to play.

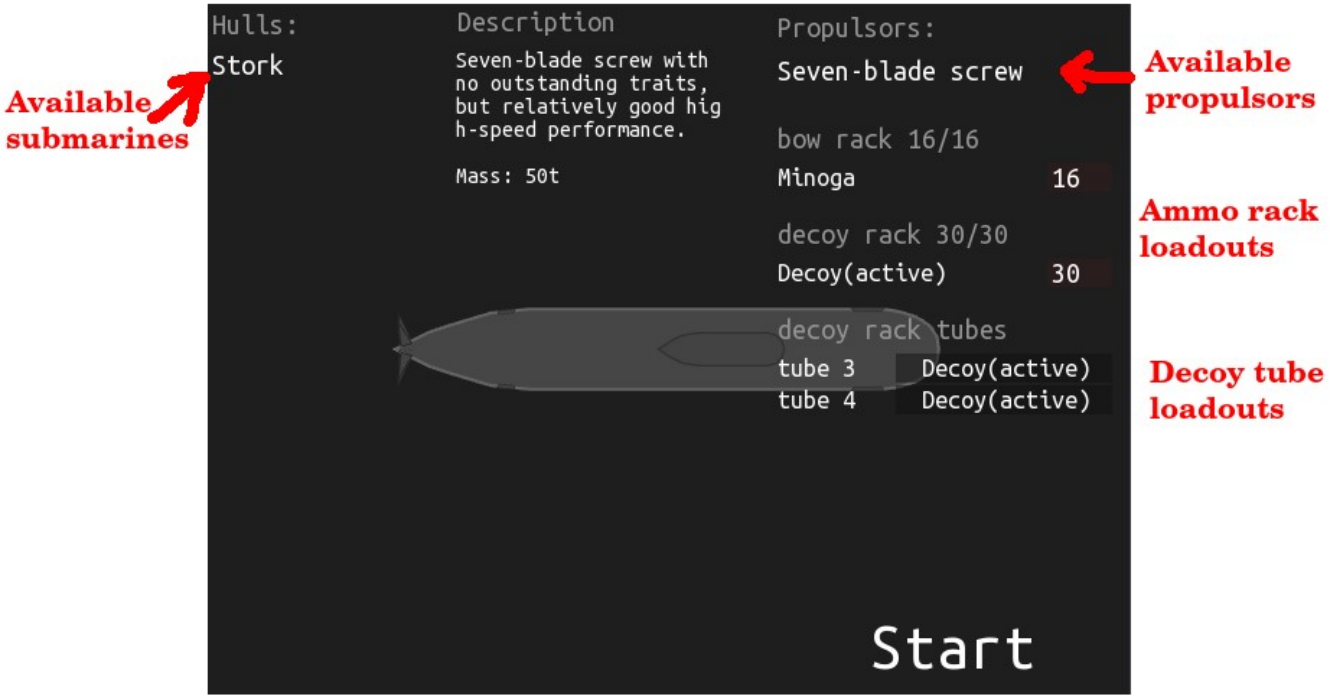
When launched, game process spawns 2 windows: console for logs and a graphical window.

Windows defender and firewall may interfere with the game, in which case they must be instructed to grant the game required permissions.

Registration and login

Enter your desired login and password to the top two text fields. By clicking “Authorize” you will be registered and logged in. You will now be able to use the same login-password pair to reconnect to your submarine, or respawn when killed.

Loadout menu



At the time of writing, only one submarine, propulsor, torpedo and decoy type are available. You can read their description by hovering your mouse over the object of interest.

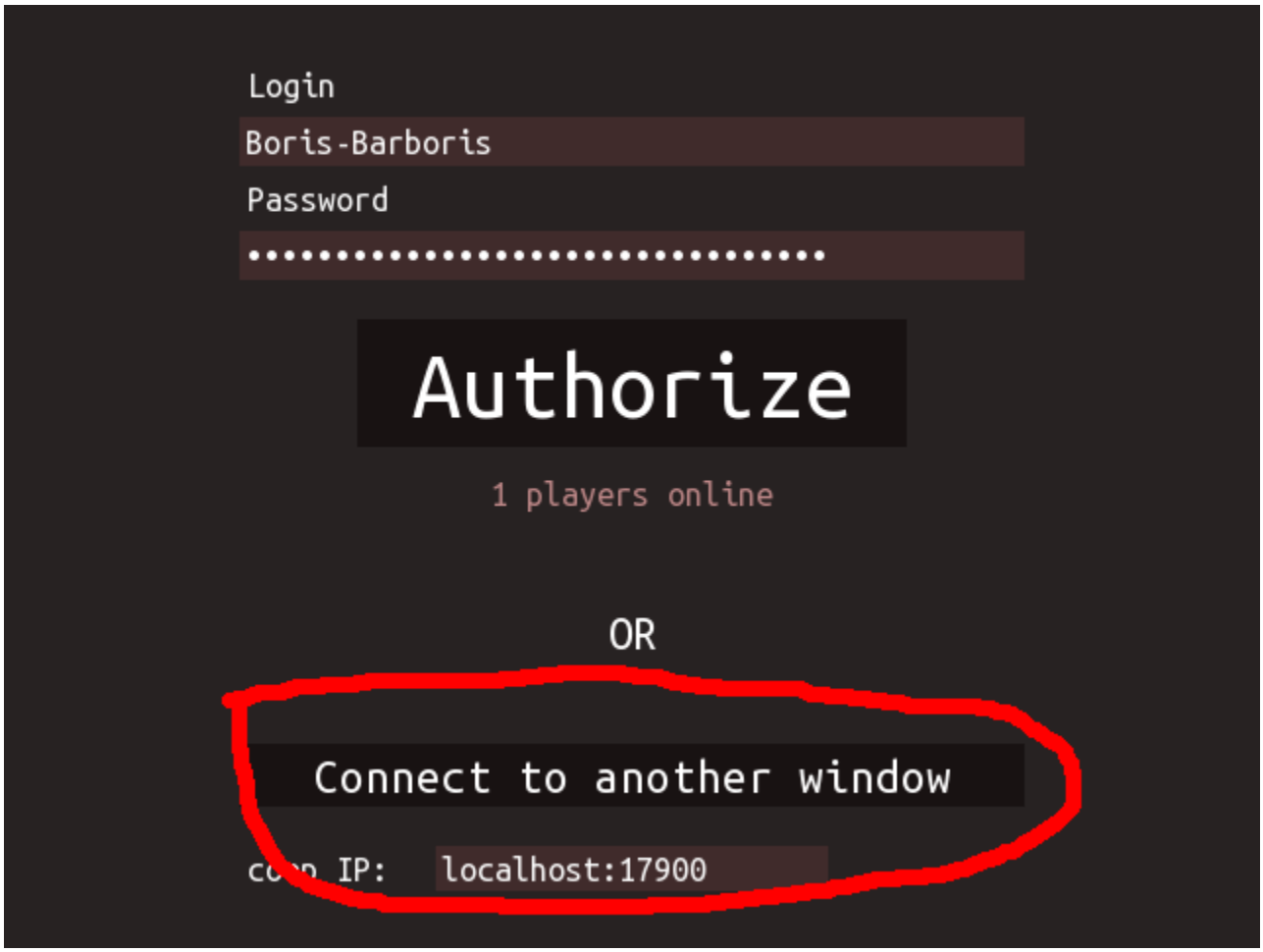
When ready, press “Start” button.

Multiple windows and COOP

Once your submarine is spawned, your main authorized window becomes a COOP server. You can connect other windows to it. You can forward TCP ports 17900-17905 on your router to your machine to play cooperatively with your friends. Main windows first tries to start coop server on port 17900, if it's busy, it tries to bind to 17901 and so on. Console log if the main window will tell the precise port number (line looks like "start CIC listening on 17900").

In order to connect to COOP server, enter it's IPv4 and port pair into "coop IP" text field and press "Connect to another window" button.

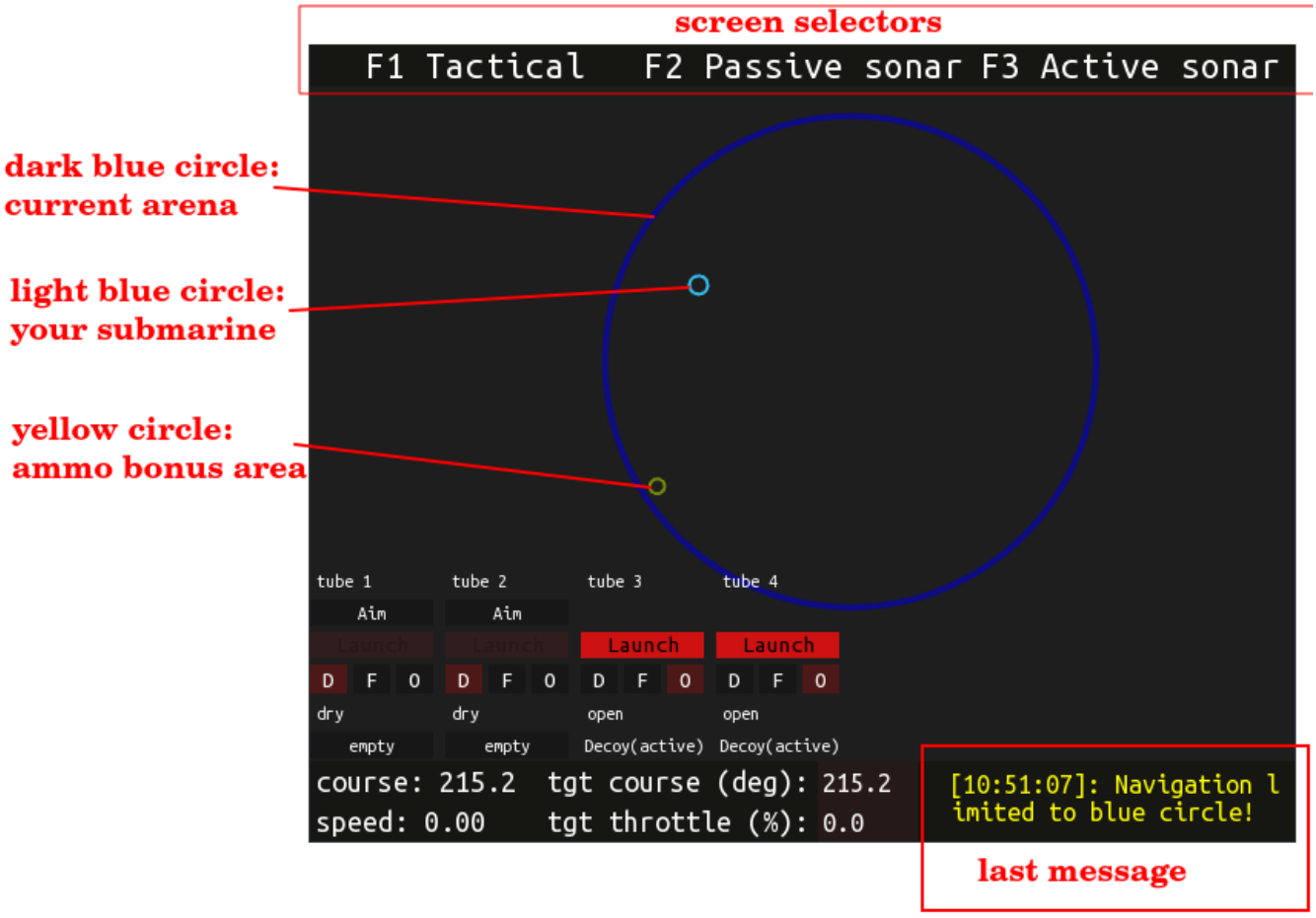
Connected windows are anonymous and not authenticated. When the main window dies or is disconnected, all it's peers get disconnected as well.



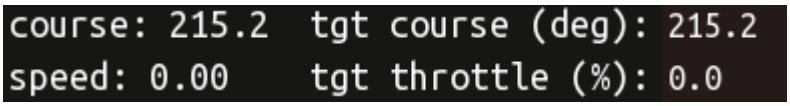
Tactical screen, demo scenario

Main screen is tactical screen, opened by F1 hotkey.
To zoom, rotate your mouse wheel. Hotkeys Q and E zoom as well.
To pan, hold your right mouse button and move the cursor. Arrow keys pan as well.
To reset camera position and center it on your submarine, press Escape on your keyboard.

Demo scenario that is running on the server designates the circular arena (dark blue circle) and forces all players inside it by overriding the desired course and throttle command.
There are three passive civilian bots swimming to random destinations, that you can practice your aim on. Once the civilian bot is killed, easy combat bot is spawned. Easy bot will only attack targets that he hears on passive sonar. For each killed easy bot medium bot is spawned. Medium bot is able to defend himself by using decoys, dodging torpedoes and using active sonar when defending himself.
When low on torpedoes or decoys, you can replenish your stores by swimming into yellow circle.
Periodically the arena is moved and players are given a limited time of unrestricted navigation.



Navigation controls



Your submarine is controlled by setting desired course and desired throttle (maps to percent of your top speed).

To change the desired course or throttle, press C or T hotkeys or click on the text field and enter a new value, then **press Enter**. Unless you press Enter, no command is sent to the server.

You can set desired course from the tactical screen by right-clicking in empty space and selecting “set course towards”. Keep in mind that it is still setting desired course and not a destination point.

Contacts

Targets and objects of interest that you encounter can be registered in your combat information center database (CIC) as contacts. You can create a manual contact in tactical screen by right-clicking empty space and selecting “create manual contact”.

When the mouse is hovered over the contact, it’s information is displayed in a panel in the top right corner.

Contact is the container for data points – sensor and imaginary data samples that together can be used to estimate the contact solution: it’s position and velocity.

Contacts can be classified in broad “type” categories, deleted, merged or trimmed (removing old data points) by right clicking on them and selecting the relevant options.

Passive sonar screen

Your submarine is equipped with a passive sonar – an array of hydrophones that lets you listen to the surroundings.

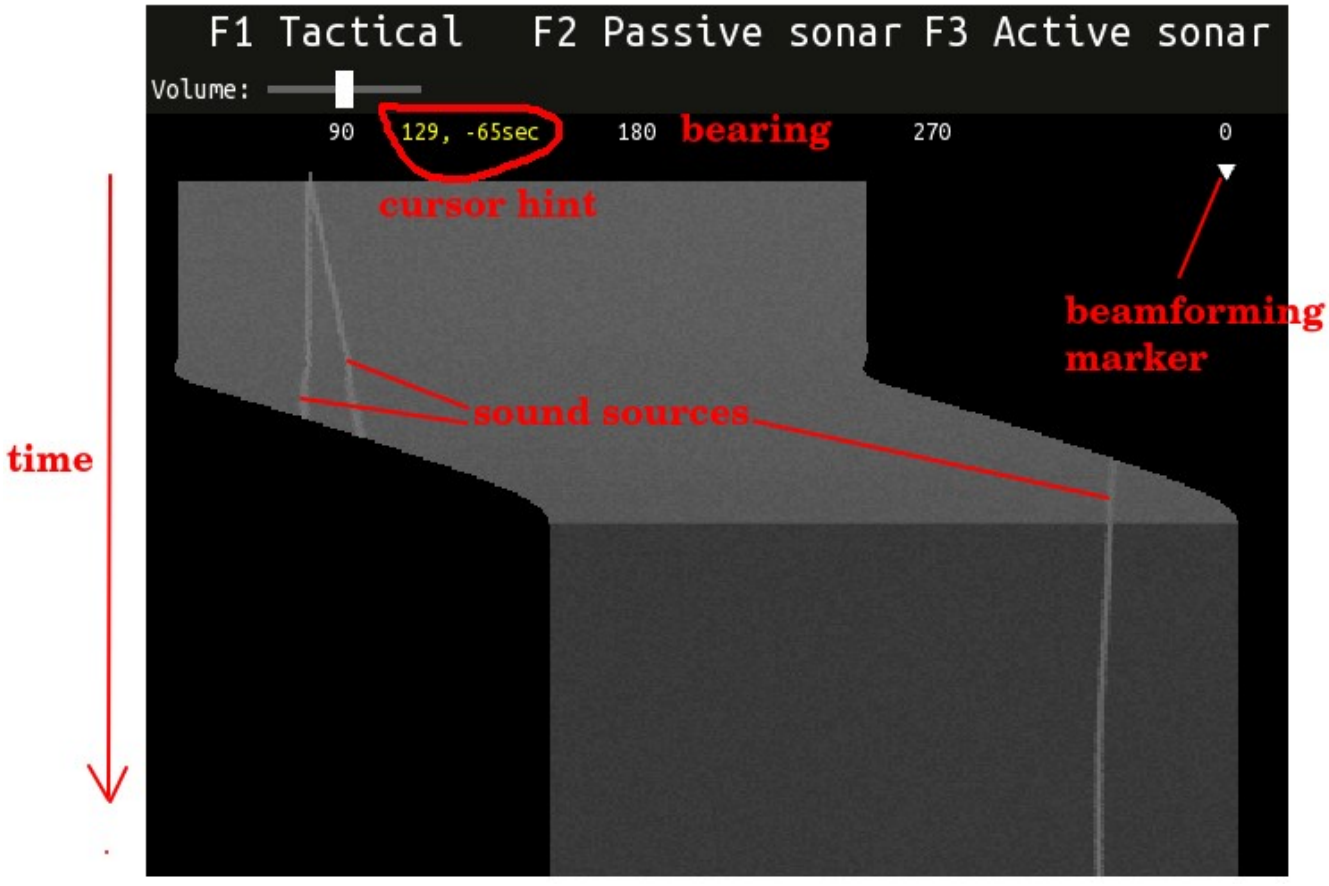
Press F2 to switch to passive sonar “waterfall” screen. Waterfall is a noise-time-bearing display that lets you visually examine history of surrounding noises, create and manage contacts and “trackers” that continuously add data samples to contacts. Noise picture moves from top of the screen to bottom as it gets older.

Waterfall display is zoomable and pannable with mouse wheen and right mouse button.

Dsubs server allows you to select one bearing to listen to and will stream audio data to your client. Use this feature to classify the noises. Select “beamforming” bearing by clicking with left mouse button once in interior waterfall area. Beam is server-side entity and is shared by all COOP windows. In future, ability to have multiple beams will be added to the game.

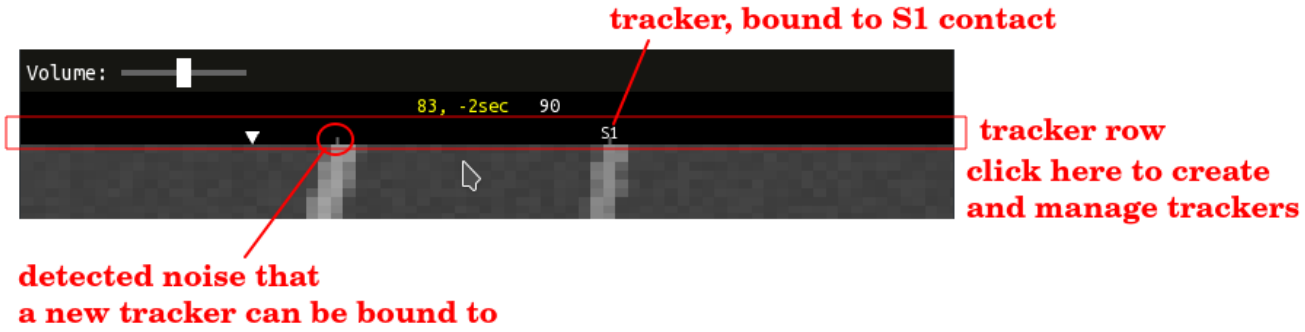
WARNING: beam bearing is updated after the click, dragging does nothing.

WARNING: streamed audio is 1 second delayed behind rendered broadband noise picture due to implementation details.

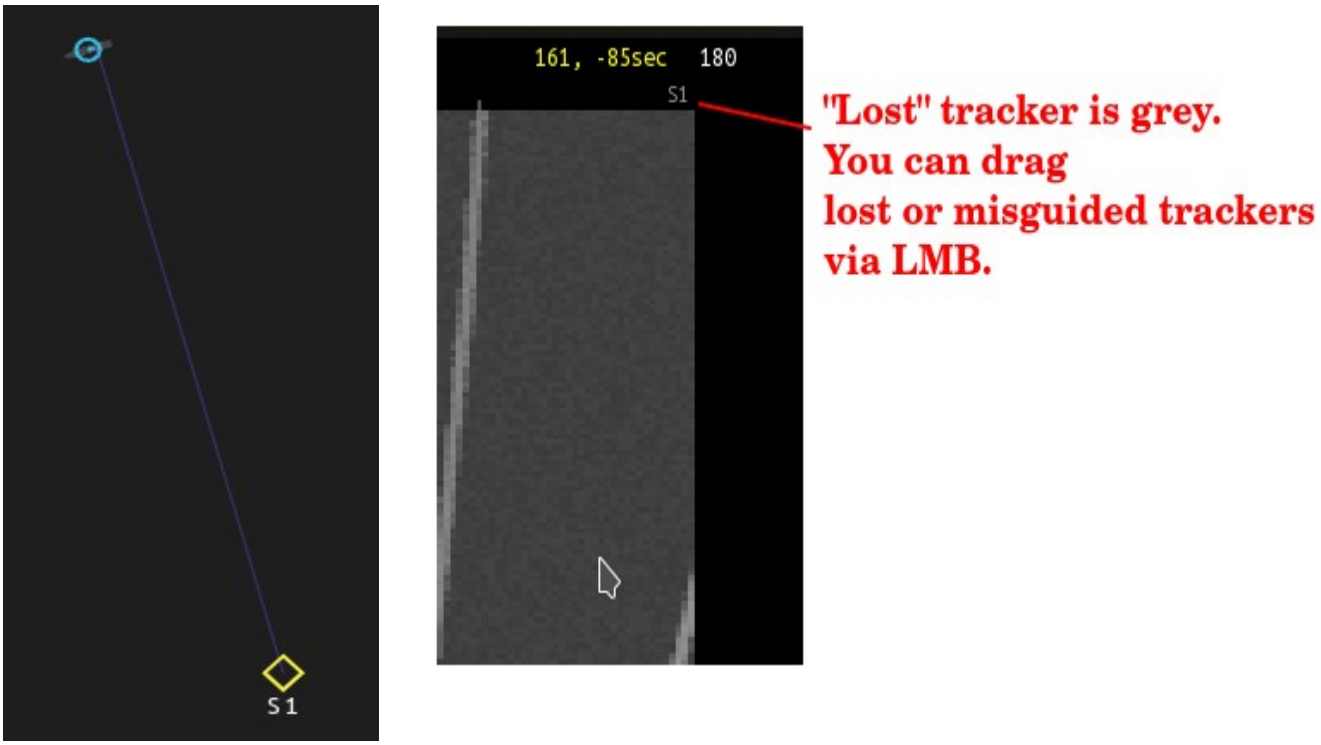


You can change the volume of the sound by moving the “Volume” slider in the top left corner of the waterfall via mouse. Left mouse button drag or mouse wheel interact with sliders in Dsubs UI.

There are two ways to create a contact from waterfall screen:
1). By creating a tracker.
2). By right-clicking inside interior waterfall point and creating contact. This is useful for registering aperiodic events, like pings or other transient anomalies.



Trackers are created by right-clicking inside a “tracker row” near a detected noise pip and selecting “create tracker”. New contact will be created, and the tracker will periodically add bearing samples to it.

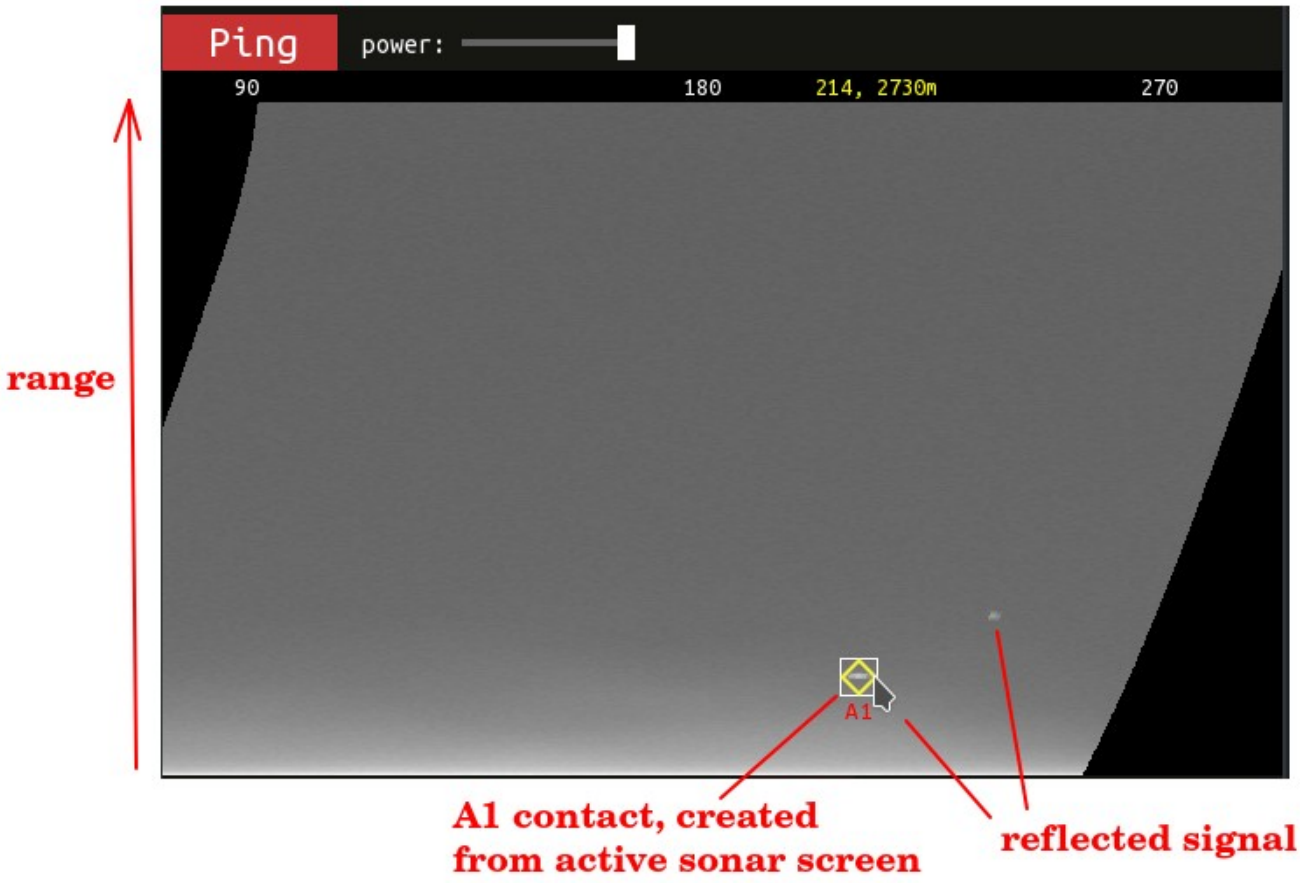


Trackers are imperfect and simply track the local broadband signal maxima, so sonar operator is expected to perform manual corrections and drop stale trackers. Tracker entity is right-clickable.

Dropping the tracker does not drop it’s contact.

In order to add tracker to existing contact you must create new tracker and merge new contact with the existing one on tactical screen.

Active sonar screen

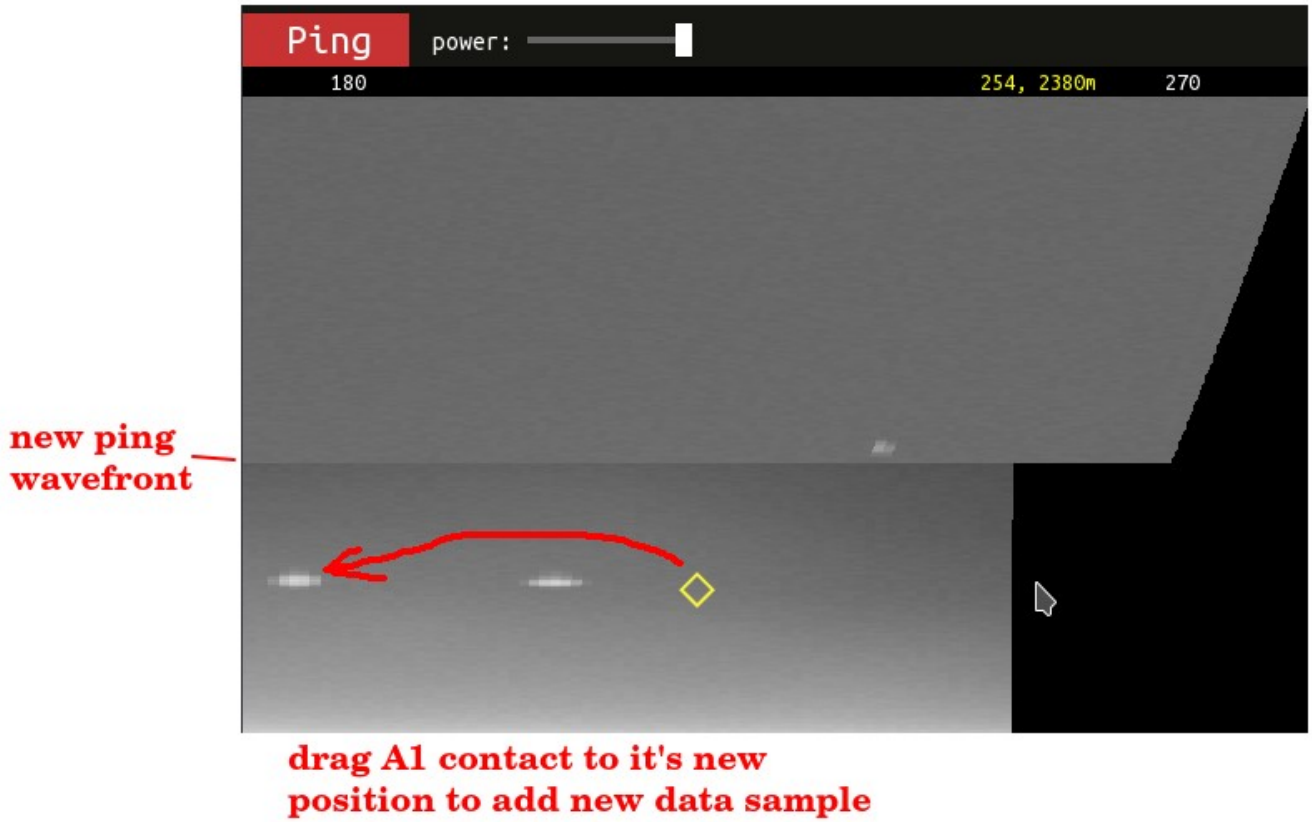


Active sonar screen allows to emit pings of configurable intensity and analyze the reflections, received from the environment.

Active sonar screen is pannable and zoomable by right mouse button dragging and mouse wheel.

Reflections that are close are drawn near the bottom of the screen, those that are far – near the top.

In order to create a new contact, right click on the reflection you are interested in and choose the “new contact” option.

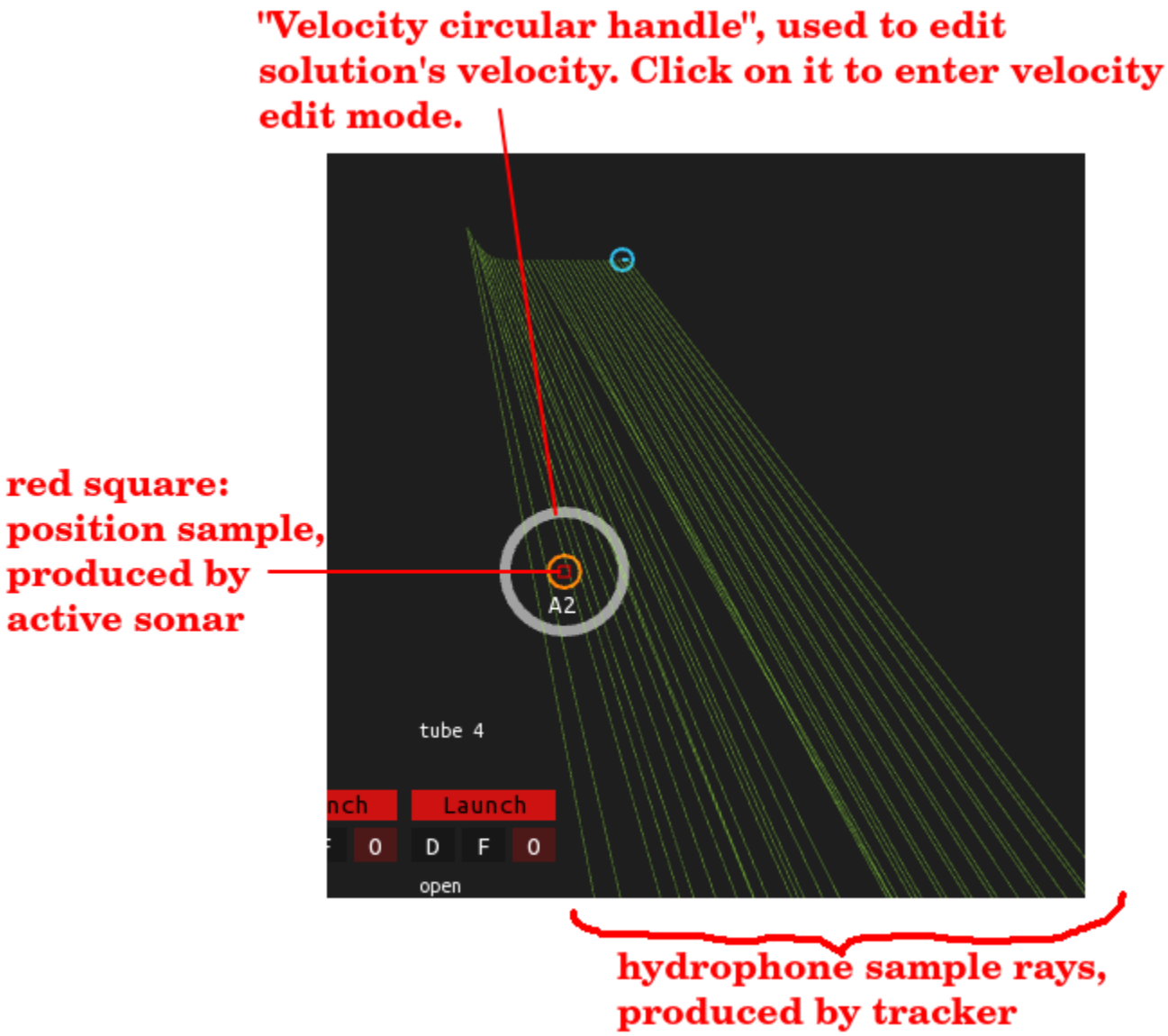


All contacts that have active sonar data samples bound to them are rendered on the active sonar screen. When the new ping is emitted, contact marks are translated as if they were stationary. You can manually “track” active sonar contacts by dragging their marks to their new reflections.

Target motion analysis

In order to hit a target, you need an estimate of it’s position and course. There parameters can be derived from the history of the contact, represented by data samples. They are imprecise, unreliable and come from various sources.

TMA mode of tactical screen is responsible for this task.
Switch to contact TMA by clicking with left mouse button on the contact on tactical screen.



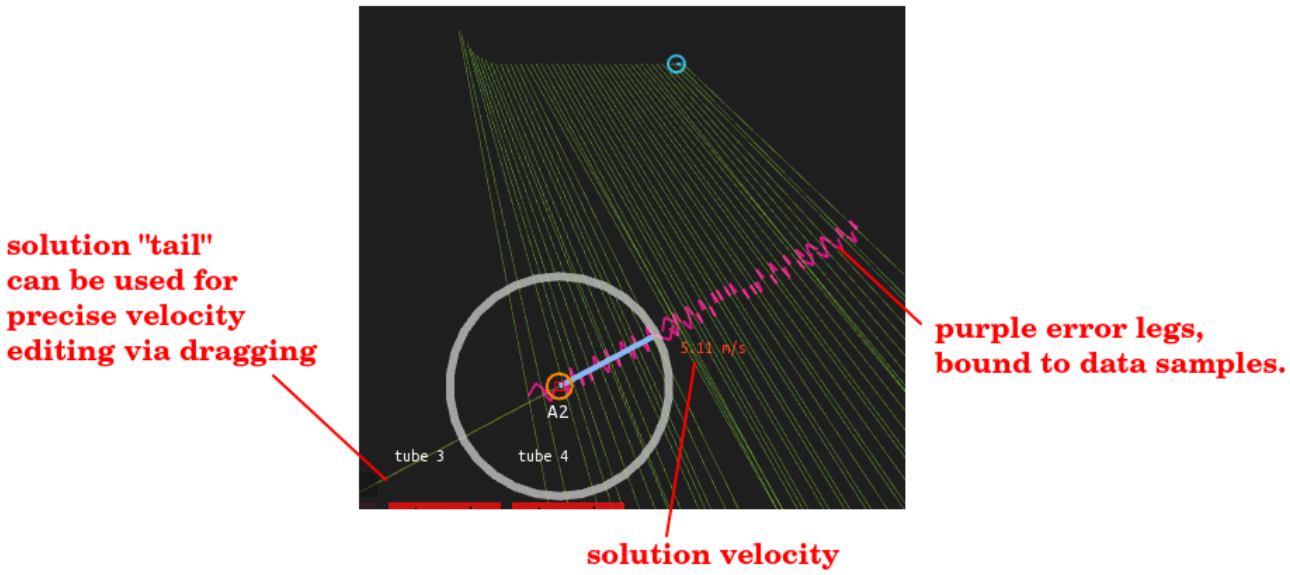
Once you have entered TMA mode, tactical screen starts rendering all data samples of this contact.

You can edit contact’s solution by dragging main contact’s pictogram (updates position) and by dragging contact’s “velocity circular handle” (updates velocity).

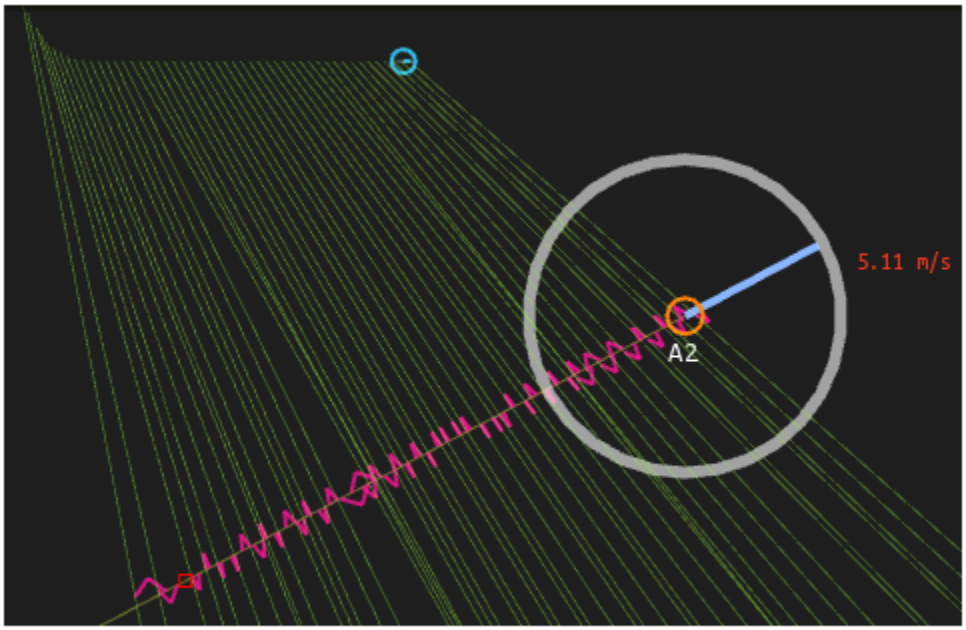
Once both contact's position and velocity defined, tactical screen starts rendering purple "error legs", which help you to estimate the solution error.

Once the initial velocity estimate is entered, contact gets a "tail" which can be dragged for delicate velocity editing.

Position data samples (small red squares), such as active sonar and manual solution samples, can be individually dropped or matched with solution precisely via context menu ("move solution here").



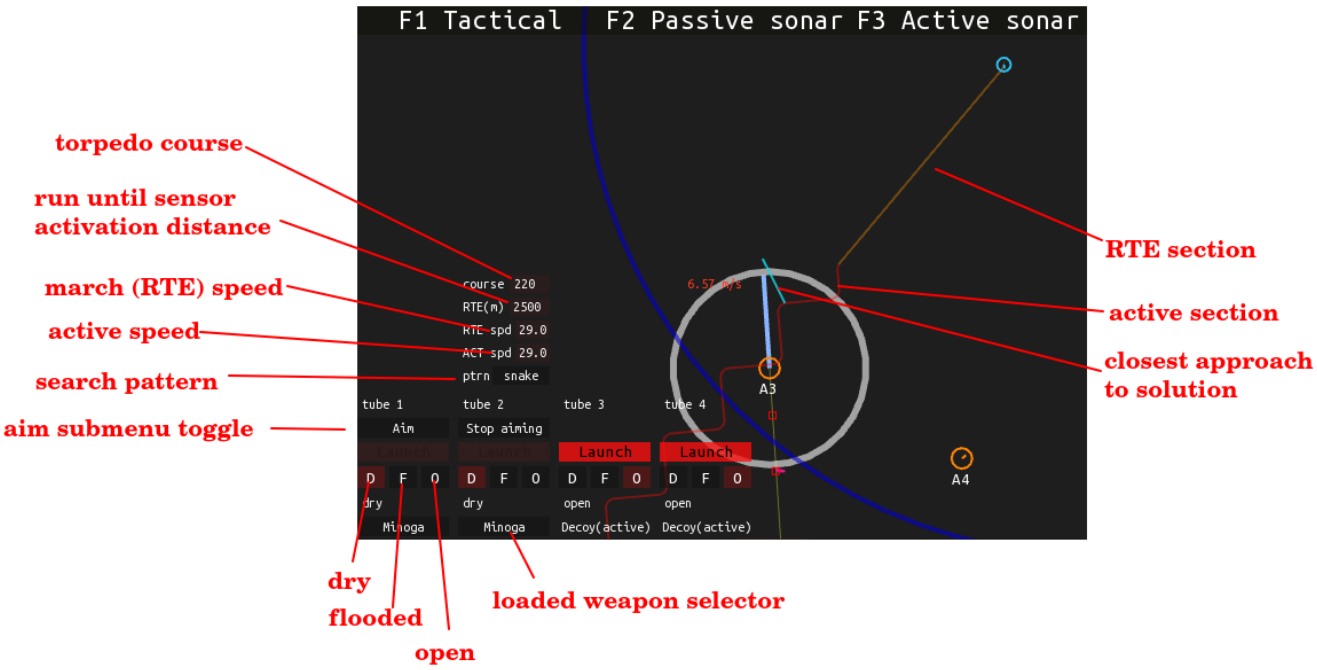
In order to exit TMA mode, left click on empty space or press Escape button. Tactical screen unfreezes the edited contact and starts moving it's pictogram using the entered solution.



TMA mode after re-entering

Torpedo tubes and decoys

Default “Stork” submarine is equipped with 2 torpedo bow tubes and 2 side-mounted decoy tubes. Tubes are loaded form the respective ammo rack of limited capacity. Racks can be reloaded by small amout by swimming into scenario reload zones (orange circle).



All torpedo tubes have the same set of internal states. Three of those states are “stable”: dry, flooded and open. You select the desired state by clicking on “D”, “F” or “O” button of the desired tube on the tactical screen.

Tube reload is only possible in dry state. Launching a weapon is only possible in open state.

Torpedo tubes can enter the “Aim” mode. In this mode tactical screen will start rending **estimated** torpedo trajectory. If you enter TMA mode for some contact **and this contact’s solution has both position and velocity specified**, tactical screen will render cyan “closest approach” line that should help you to aim.

Aiming is done by editing torpedo course, RTE, speed(s) and pattern parameters in the text fields above the tube’s UI.

WARNING: weapon parameters are not synchronized between COOP windows.

Kill records

Delayed player kills are rendered on https://boris-barboris.github.io/dsubs_demo/ and updated once in 2 hours.