



### Purpose:

NPCNS Simulator is intended for training of:

- cadets of the navigation faculties in accordance with requirements of Sections A-II/1, A-II/2, as related to gaining navigation plotting skills, and B-II/1 p. "Training in celestial navigation" of STCW Convention at the early stages of training
- small craft navigators

### List of basic knowledge and skills, worked out with the use of NPCNS simulator:

- Work with the "printed" nautical chart.
- Position fixing with the use of different methods with the application of simulators of navigational equipment.
- Execution of preliminary route plotting and route monitoring.
- Conducting of main types of navigational calculations, required during the vessel is on the way.
- Use of astronomical instruments and teaching aids for the aims of vessel's position fixing and heading indication system adjustment reckoning in real time mode.

### Configuration

The simulator consists of the Instructor workplace and Students workplaces interacting with each other over a local network. The Student workplace is equipped with software, computer equipment, a set of printed nautical charts, plotting instruments and a specialized chart table.

### Scheme of work

Instructor on the Instructor Workplace issues to each Student Workplace advance made exercises, consisting of one or several navigation or astronomy tasks.

For task solution each student being on its "virtual" vessel has the possibility to: observe surface picture and sky, take readings from the navigation equipment and astronomic instruments imitators, use "paper" nautical charts and astronomic tables.

Results of performing calculations on each task are saved on Student Workplace. After performing of the full exercise results of calculations are sent to Instructor Workplace where automatic valuation is made.

### Target groups

Navigators in accordance with requirements of Sections A-II/1, A-II/2, as related to gaining navigation plotting skills, and B-II/1 p. "Training in celestial navigation" of STCW Convention at the first stages of education

### Ship types

Generic

### Regulations

- STCW Code, Sections A-II/1, A-II/2
- STCW Code, Section B-II/1 p.19 "Training in celestial navigation"



### Instructor WorkPlace software

Instructor WorkPlace is intended for control of the students' training process.

With the help of Instructor WorkPlace software instructor has the possibility of:

- assign advance made exercises to Student WorkPlaces;
- make amendments to the exercise conditions before it is issued to Student WorkPlaces;
- control the status of student included tasks performance;
- on the implemented electronic chart system and a set of vector charts monitor the way points, current location, course, speed and other vessel parameters, location of target vessels and navigation references;
- receive results of each task implementation individually and full exercise in general by automatically formed evaluations;
- form and store in the register the results logs of students' practical training.

### Exercise editor

Exercise editor is intended for development and storage of exercises for their future use. During forming of the exercise there are performed:

- determination of navigation area and type of the vessel
- setting the current date and time of the day
- setting up the route of the vessel is set up
- inputting required corrections
- setting up limit of time for performance
- setting up location of target vessels
- setting up hydrometeorological conditions
- setting up condition of navigational and astronomic devices work mode

### Student WorkPlace software

Student WorkPlace allows drilling the following practical skills:

#### ➡ *in navigation*

- dead-reckoning navigation (performing the main types of graphic plotting on the paper chart taking into consideration the external factors influence) including:
  - calculation of vessel's position by known movement elements (course and speed): vessel coordinates, distance covered, log readings.
  - calculation of the course and arrival time to the waypoint with the known coordinates in the given moment of time.



- position-finding (observation) by landmarks with the use of Radar simulator and visual monitoring:
  - by bearings and distance;
  - by 2 bearings; by 2 distances;
  - by 3 bearings; by 3 distances;
  - by 2 horizontal angles;
  - by cross-bearing method.
- pilotage (student should go through all the given waypoints), among them in the presence of wind and current.

➔ *in nautical astronomy*

- determine sextant corrections by horizon, star, Sun observation;
- determine chronometer correction;
- measure celestial altitudes with the use of sextant;
- correct celestial altitudes measured by sextant;
- adjust altitudes measured by sextant to one zenith;
- figure out celestial bodies for astro-navigational observations with the help of celestial globe;
- calculate longitudinal solar altitude time;
- determinate latitude by the Polar star height or by longitudinal solar altitude;
- determinate sunrise/sunset time;
- determinate time of the beginning and ending of observation (nautical twilight);
- train for celestial observation with the help of celestial globe;
- obtain coordinates fixed by observation by Sumner position lines;
- study the starry arch in any hemisphere;
- compass correction determination by sunrise azimuth or by celestial body bearing in selectable azimuth.

Simulation of the following equipment on the Student WorkPlace gives feeling of the real navigational bridge:

- magnetic compass,
- gyrocompass,
- optical position-finding device,
- radar,
- GPS receiver-indicator,
- water speed log,
- sextant,
- celestial globe;
- chronometer;
- stop-watch timer.



Student WorkPlace software includes:

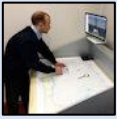
- system of surface picture and sky visualization in different time of the day,
- electronic chart with the plotting.

Measurements can be performed on different cargo and small craft vessels (15 models).

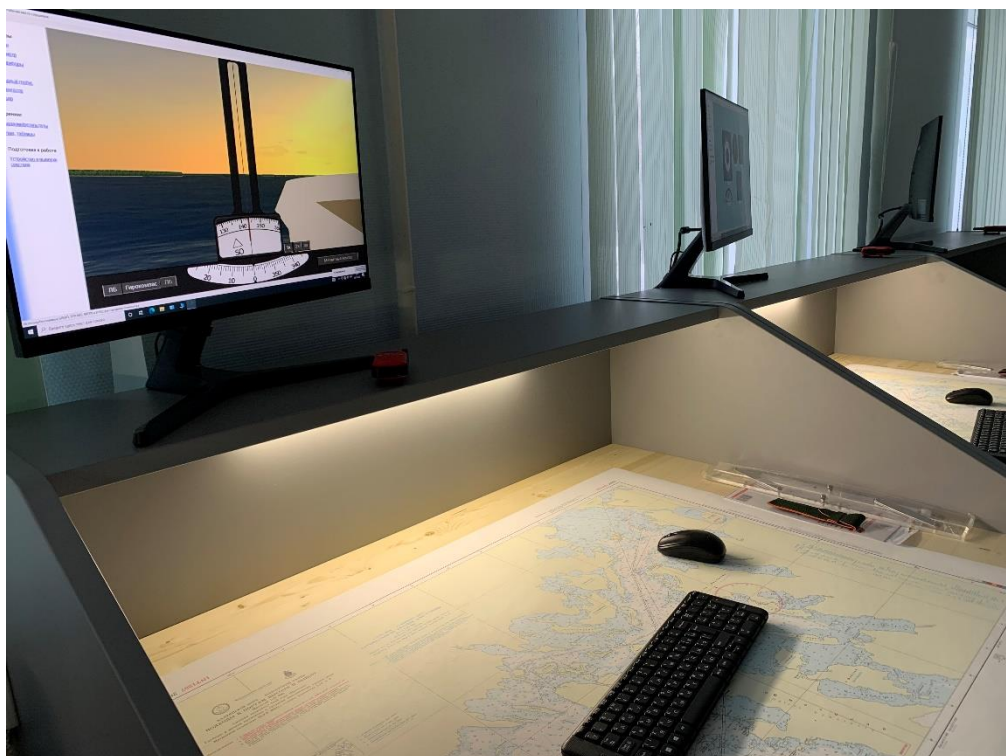
### List of simulated areas:

1. Bosphorus Strait (Turkey)
2. Takoradi (Ghana)
3. Strait of Gibraltar
4. Surabaya (Indonesia)
5. Tangier Mediterranean Sea (Morocco)
6. Rostock (Germany)
7. Viano de Castelo (Portugal)
8. St. Petersburg (Russia)
9. Temryuk (Russia)
10. Singapore

Methodological guidelines and type exercises are developed for Singapore and St. Petersburg (Russia) navigation areas. These areas are included in the standard configuration. Other areas are supplied at the Customer's request. Exercises for them can be developed independently using the exercise editor built into the Instructor Workplace.



Instructor workplace



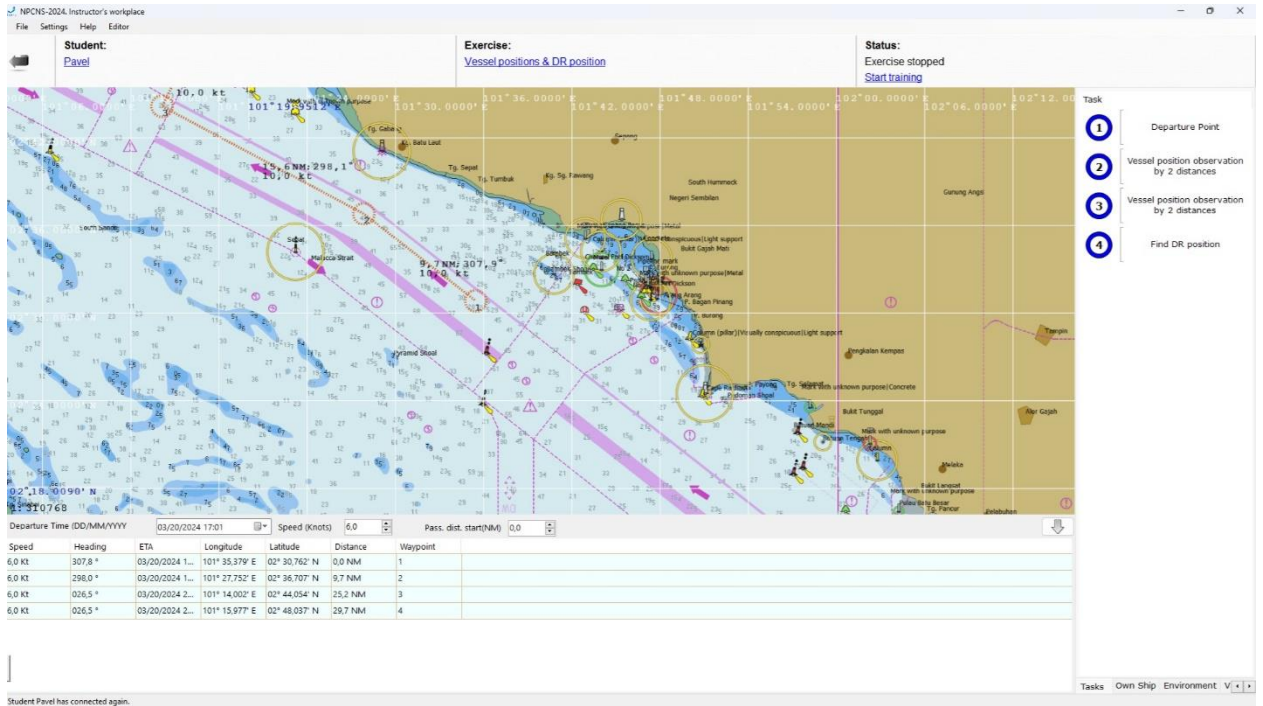
Student workplace



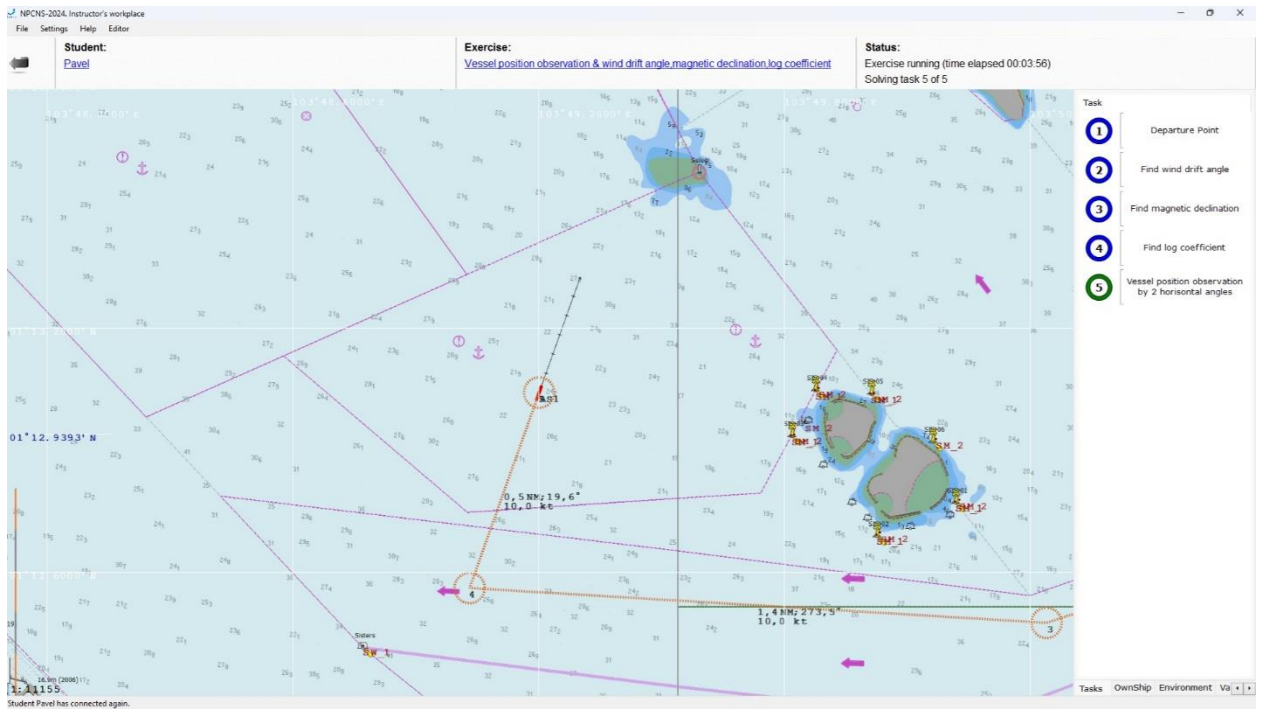
Student workplaces



Student workplace



Instructor workplace. Exercise forming



Instructor workplace. Exercise forming



Speed	Heading	ETA	Longitude	Latitude	Distance	Waypoint
6.0 Kt	229.3 °	03/20/2024 1...	104° 26.399' E	01° 24.924' N	0.0 NM	1
6.0 Kt	260.5 °	03/20/2024 1...	104° 19.242' E	01° 18.719' N	9.5 NM	2
6.0 Kt	262.0 °	03/20/2024 2...	104° 09.792' E	01° 17.132' N	19.1 NM	3
6.0 Kt	262.0 °	03/20/2024 2...	103° 56.930' E	01° 15.322' N	32.1 NM	4

Instructor workplace. Exercise forming

**Task #1**  
Task name: Departure Point  
No evaluation criterion provided

**Task #2**  
Task name: Vessel position observation by 2 distances  
Result

Criterion	Calculated value	Actual value	Difference	Result
Position	00° 00,000' N 000° 00,000' E	02° 36,707' N 101° 27,752' E	60971,1767578125 cb	NotSatisfactory

**Task #3**  
Task name: Vessel position observation by 2 distances  
Result

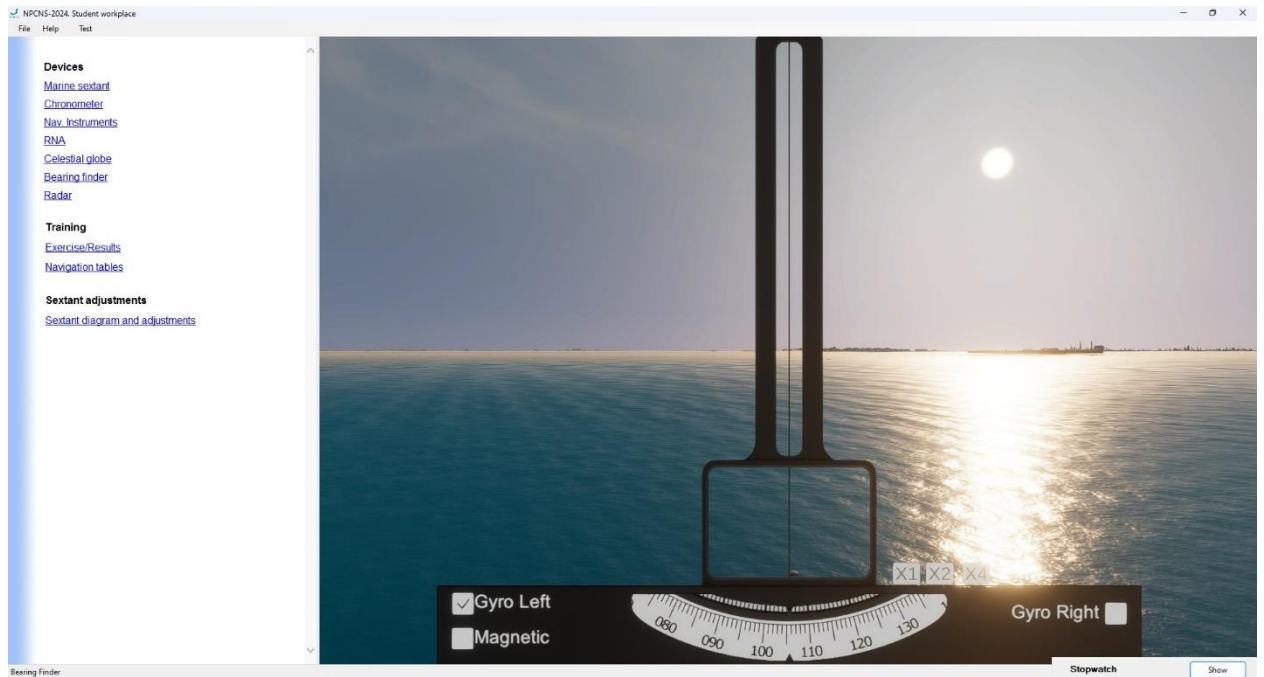
Criterion	Calculated value	Actual value	Difference	Result
Position	00° 00,000' N 000° 00,000' E	02° 44,054' N 101° 14,002' E	60832,900390625 cb	NotSatisfactory

**Task #4**  
Task name: Find DR position  
Result

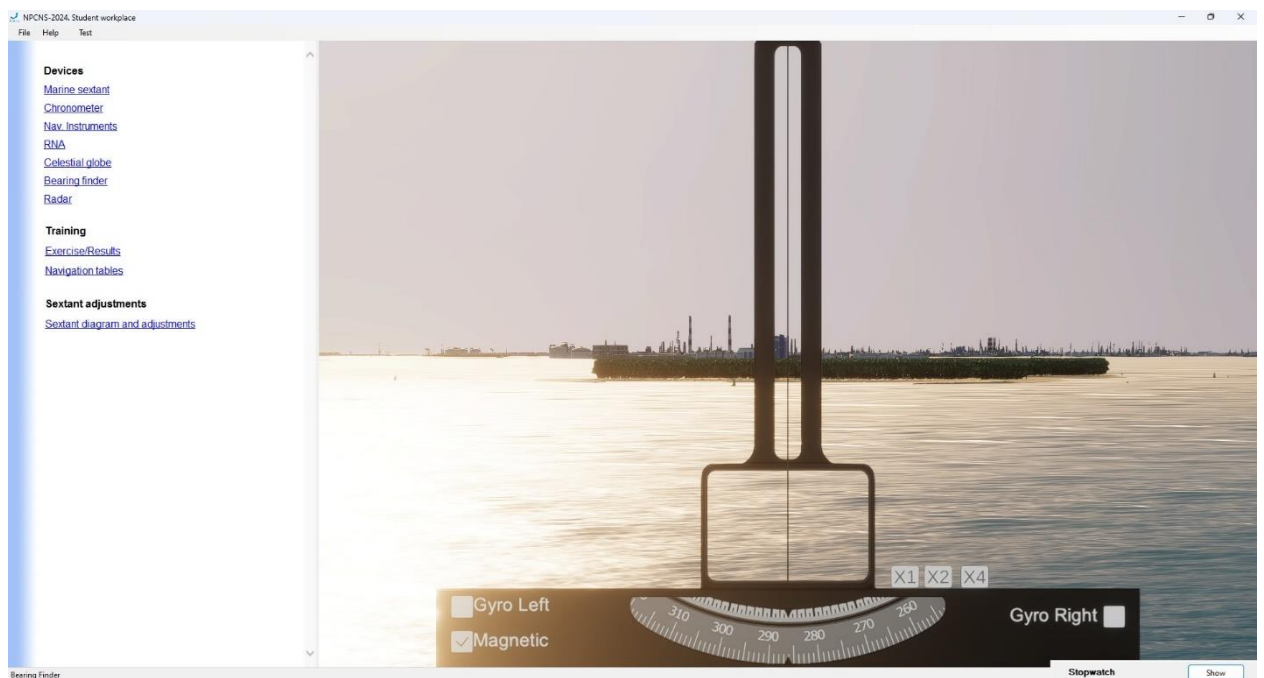
Criterion	Calculated value	Actual value	Difference	Result
Position	12° 00,000' N 034° 00,000' E	02° 48,037' N 101° 15,977' E	40377,13623046875 cb	NotSatisfactory

Instructor workplace. Report

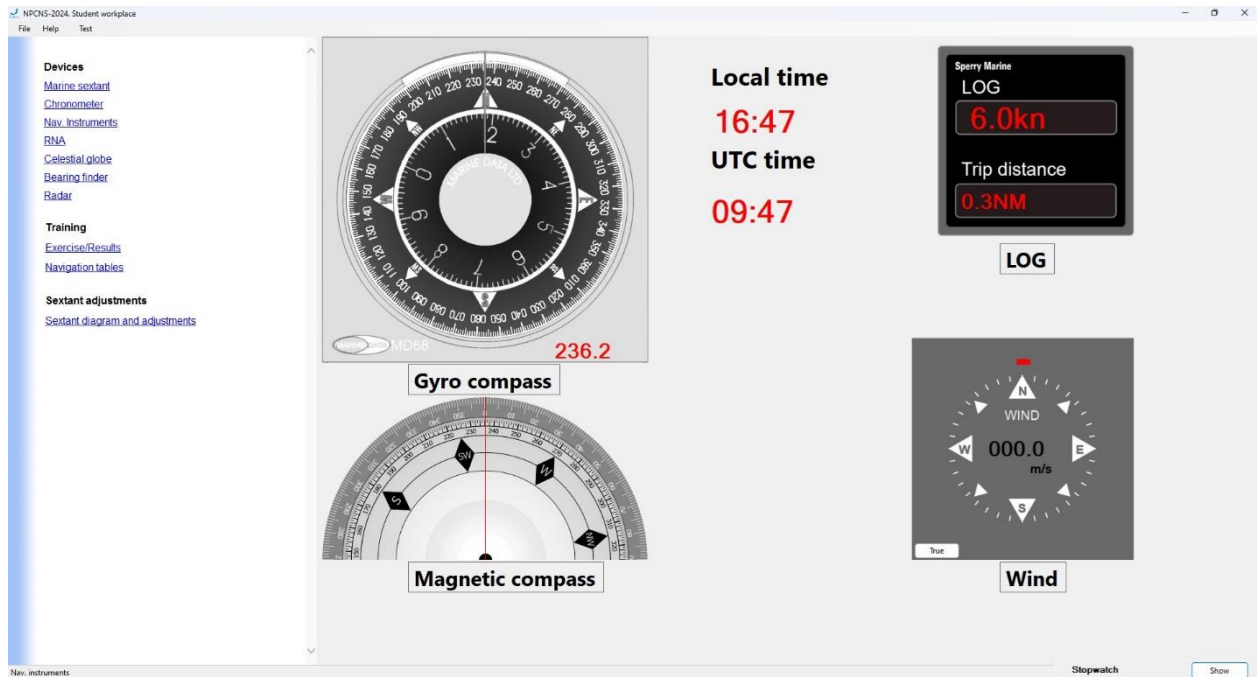




Student workplace. Optical position-finding device



Student workplace. Optical position-finding device



Student workplace. Navigation devices



Student workplace. Radar



# Simulator

## NPCNS NAVIGATION PLOTTING AND CELESTIAL NAVIGATION SIMULATOR



The screenshot shows the simulator's main interface. On the left is a sidebar menu with sections: **Devices** (Marine sextant, Chronometer, Nav. Instruments, RNA, Celestial globe, Bearing finder, Radar), **Training** (Exercise/Results, Navigation tables), and **Sextant adjustments** (Sextant diagram and adjustments). The main display area is titled 'AIS-70' and 'GP170'. It features a SAMYUNG display showing a 'TARGET PLOT' of an AIS target. The plot includes a map with various colored overlays and a data panel on the right with the following information:

GNSS INT	09/09/24
	07:54
POSITION	01°12.64'N
	103°50.95'E
SOG	6.00 kn
HDG	251°

Below the plot are buttons for LIST, INFO, OWN, and H-UP. The SAMYUNG display is mounted on a panel with F1-F4 function buttons and a numeric keypad. The keypad includes buttons for 1-9, 0, \*, #, MENU, and a directional pad. A 'Stopwatch' button is visible at the bottom right of the display area.

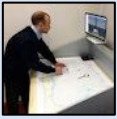
Student workplace. AIS

The screenshot shows the simulator's main interface, similar to the previous one. The sidebar menu is on the left. The main display area is titled 'AIS-70' and 'GP170'. It features a FURUNO display showing a GPS plot. The plot includes a map with various colored overlays and a data panel on the right with the following information:

INTGRTY	CP-DTD	1.2	Safe	10nm		
	WGS84	08:50:48		09/09/2024		
GPS	SBAS	GLONASS	SV (PRN)	SNR	SV (PRN)	SNR
			01	33		
			17	47		
			09	42		
			34	51		
			03	29		
			11	38		
			29			
			24			

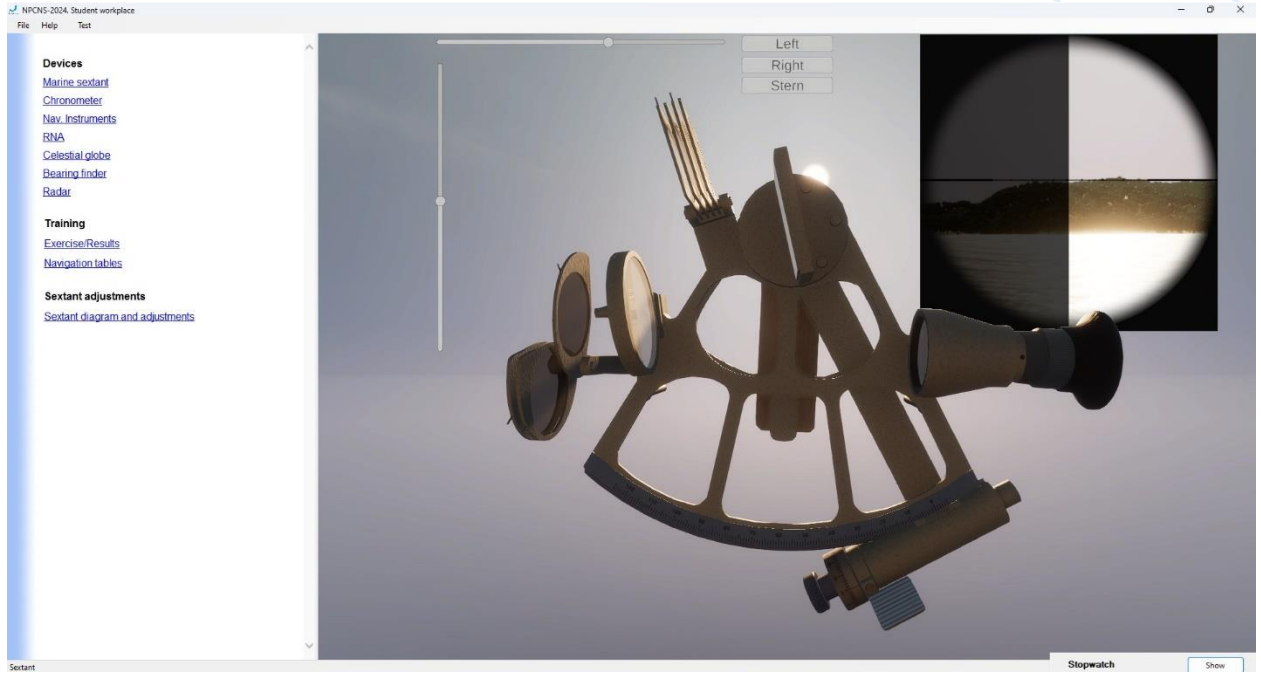
Below the plot are buttons for MENU/ESC, LIST, DISPLAY, MOB, ZOOM IN, ACK DELETE, and a directional pad. The FURUNO display is mounted on a panel with a numeric keypad and a power button. The keypad includes buttons for MENU/ESC, NU/ENT, LIST, DISPLAY, ROUTE, GO TO, MOB, MARK EVENT, PLOT ON/OFF, ZOOM IN, CENTER, ZOOM OUT, ACK DELETE, CURSOR ON/OFF, and BRILL. A 'Stopwatch' button is visible at the bottom right of the display area.

Student workplace. GPS



## Simulator

# NPCNS NAVIGATION PLOTTING AND CELESTIAL NAVIGATION SIMULATOR



Student workplace. Sextant