ComNav®

Ingenuity in Motion

M10 MULTI-FUNCTION CHART-PLOTTER AND AUTOMATIC IDENTIFICATION SYSTEM

Installation & Operation Manual

Certified System
ISO 9001

CE

Welcome

Congratulations on your purchase of ComNav M10 Muti-Function Chart-Plotter and Automatic Identification System (AIS)! At ComNav, we are dedicated to reliability & quality in all our products, these products are a good example of that. We promise to do our best to ensure your satisfaction with your new multi-function chart-plotter and AIS system.

Warranty Notice

Prior to the operation of the equipment, ensure that you read, understand, and accept the conditions of the warranties as detailed in the **Warranty Information** section of this manual.

General Notice

This document, ComNav part number 29010118 Version 1 Revision 1, is the approved Product Manual for the Multi-Function Chart-Plotter and Automatic Identification System. Where versions of this manual exist in other languages, the English version shall be considered authoritative.

Copyright

Warning

USA – Federal Communication Commission (FCC)

Radio Frequency radiation exposure information:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The equipment is expected to operate with the following requirements:

- If the operation of the equipment is not expressly approved by ComNav, ComNav at its sole authority could void the user's rights to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: 1) This device may not cause harmful interference and 2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested in accordance and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

Caution: Exposure to Radio Frequency Radiation.

Canada – Industry Canada (IC)

This equipment complies with RSS210 of Industry Canada. Operation is subject to the following two conditions: 1) This equipment may not cause interference, and 2) This equipment must accept any interference, including interference that may cause undesired operation of this equipment.

Europe – Declaration of Conformity

This equipment is in compliance with part 15 of the FCC. Operation is subject to the following two conditions:

1) This equipment many not cause harmful interference, and
2) This equipment must accept any interference received, including interference that may cause undesired operation.

This product complies with essential requirements and other relevant provisions of the Directive 2014/53/EU. This declaration of conformity is another quality commitment from ComNav.

Technical Support

In order to provide you the best technical support if you cannot find the information in this manual, whether it be for installation, operation or queries, you are encouraged to contact your local authorized ComNav technical servicing dealer. To locate the ComNav authorized dealer near you, please contact:

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Document History

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1	10 July 2021	First Release

About this Manual

This manual provides essential information for the safe and reliable operation of the ComNav M10 Muti-function chart-plotter and Automatic Identification System. Read this manual in its entirety before using the M10 for the first time. Keep the manual handy until you become thoroughly familiar with the operation of the device.

Your Comments

Your feedback about this user guide will help us to improve reviews of this version for development of future revisions. Please email all your comments to service@comnav.com.

Manual Format

This manual has been formatted to be printed on both sides of the pages of the manual, and on standard Letter-sized paper (8.5" x 11").

If you have obtained this manual as a soft-copy, please note that it is in Adobe® Portable Document Format ("pdf"), and so may be viewed & printed with Adobe Reader®, or compatible pdf-format viewers.

When printing this manual with Reader, you should select "duplex printing" (or the equivalent term used by your printer's software driver), in order to print it double-sided on the paper. If your printer does not have built-in duplexing capability, you can still print this manual double-sided by following the instructions that came with your printer for doing "hand duplexing".

You should also select the Auto-Rotate and Centre option in the Print Dialog box, de-select the Choose Paper Source by PDF page size option; as well, you should set Page Scaling to None – Reader's default setting is Shrink to Printable Area, and is printer-dependant (usually set at ~97%), but that is not needed here.

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Introduction

Overview

The M10 Multifunction Chart-plotter and Automatic Identification System (AIS) offers a reliable and integrated navigation solution using a built-in GPS chartplotter and a class B AIS transponder. The M10 offers real-time weather updates, a large data memory storage capacity to store waypoints and tracks, various connectivity options and automatic software updates to stay up to date with the latest features.

Figure 1 - The M10.

Safety Notes

Before using the M10 please make sure to read the following precautions to avoid product failure caused by improper operation:

- Do not operate the M10 without its original power adapters. Otherwise, the navigator may not work properly or the performance might be affected or even the equipment will be damaged. The M10 voltage is
10-36V DC, please do not exceed this voltage range.
- Please do not place the unit and its accessories in a damp environment or under the direct sunlight. Keep the unit in the dry environment.
- Power supply should be grounded to avoid static. If the device is not in use, please turn off the unit.
- If the device cannot find a position fix for a prolonged time, please check whether the antenna is installed properly, and if there is any interference. Make sure to follow the correct antenna installation procedure. During the start-up stage, please do not arbitrarily remove the antenna in order to avoid damages to the equipment.
- When the ambient temperature is too high, the unit may not function properly. Stop using the equipment until the temperature returns to normal and restart the equipment.
- Avoid direct sunlight on the LCD screen. You can adjust the angle of the screen anytime to get the best visual effects.
- When hardware failure occurs (e.g. power lines are burned, machine is damaged or foreign bodies fall into the equipment, etc.), please shut down the power and contact Comnav immediately.

Installation
and
Operation

Installation

Please refer to the Warranty Information section of this manual before proceeding with installation of the M10.

Tools Required

General-purpose tools such as a portable drill, pliers, wire cutters, screwdrivers, wire, mounting bolts and wrenches will be required. An accurate voltmeter or multi-meter would also be useful.

Hazard warning!

Extreme caution is advised when using tools powered by alternating current (AC) from main supply circuits, regardless of whether those circuits are rated for "indoor", "outdoor", "marine" or "industrial" use. Water, especially sea water, is an excellent conductor of electricity, and can complete a path to AC Ground through your body, causing injury or death, if a tool malfunctions or short-circuits.

ⓘ Battery powered tools are STRONGLY recommended ⓘ

If AC tools are used, they must be plugged into a circuit that is adequately protected against Ground Faults and other safety hazards, in accordance with local electrical codes.

Power Supply

Unit is powered by the vessel's or vehicle's power supply system and must have an adequate circuit breaker or fuse. Power supply must be in voltage range of 10 to 36 volts DC. It is recommended to connect the unit to power via an on/off switch.

Ensure adequate wire sizes are used to handle the expected maximum currents.

Environmental Considerations

- Ensure that the M10's Operating & Storage Temperature Ranges are not exceeded (see **Error! Reference source not found.** in Appendix 2).

Warnings and Cautions

An absence of specific alerts does not mean that there are no safety risks involved.

A Warning or Caution information is intended to minimize the risk of personal injury and/or damage to the equipment.

WARNING – Warning alerts you to a potential misused or wrong setting of the equipment.

CAUTION – Caution alerts you to possible risk of serious injury to a person and/or damage to equipment.

Regulations and Safety

The M10 contains a built-in wireless modem for signal communication through Bluetooth® wireless technology or through external communication datalink. Regulations regarding the use of the wireless modem vary greatly from country to country. In some countries, the unit can be used without obtaining an end-user license. However, in some countries, the administrative permissions are required. For license information, consult your local dealer. Bluetooth® operates in license-free bands.

Before operating a M10, determine if authorization or a license to operate the unit is required in your country. It is the responsibility of the end-user to obtain an operator's permit or license for the M10 for the location or country of use.

Use and Care

CAUTION – Operating or storing the receiver outside the specified temperature range will cause irreversible damage.

Getting Started with M10

About the M10

This manual describes the Installation and operation of the M10 Muti-function chart-plotter and AIS.

Button Function and Operation

This Figure 2 shows a schematic of the M10 front panel where the knobs and buttons are labelled and a description of their functionalities given in Table 1.
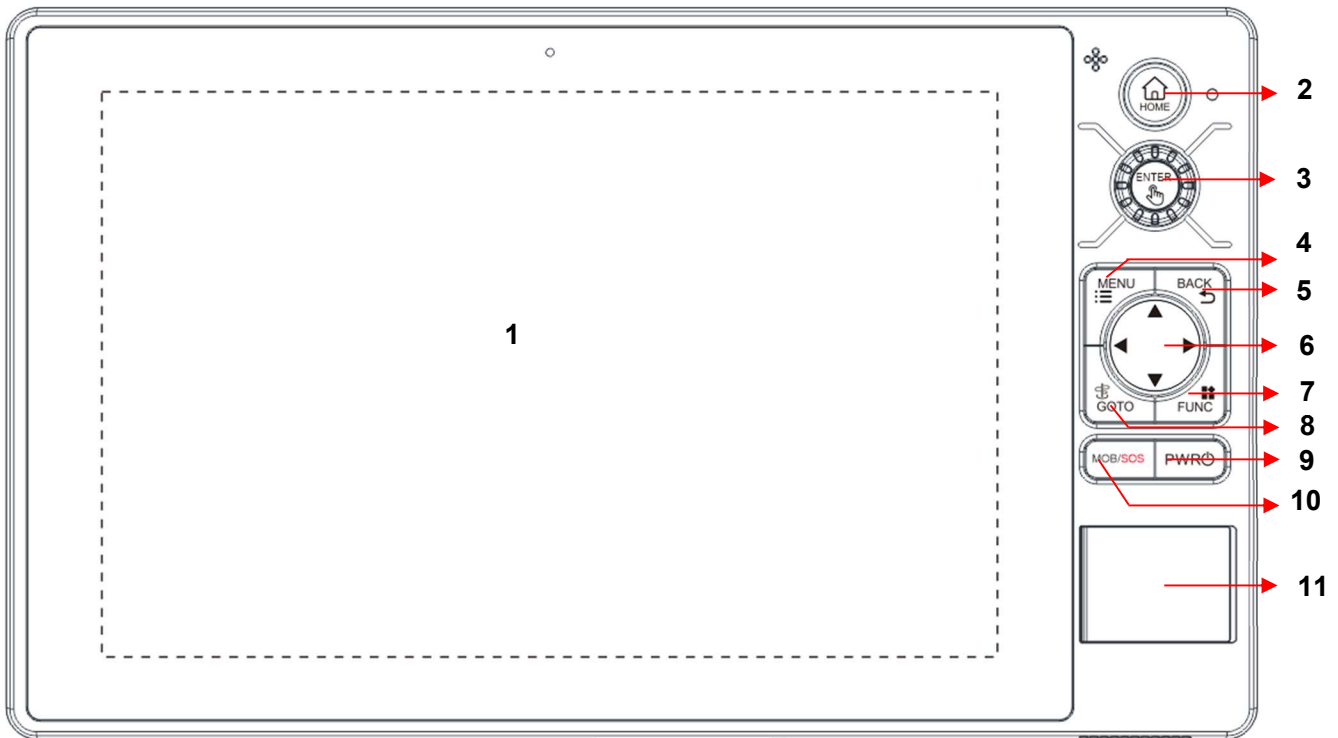
Figure 2 - M10 front panel.

Feature Label	Feature Name	Description
1	Touch Screen	Interaction via touch to select menu items and zoom in/out
2	HOME Button	Press to return to the home page.
3	Knob	1) Knob: Rotate clockwise to zoom into the chart, counterclockwise to zoom out. 2) Button: Press to confirm operation.
4	MENU	Press to reach the Main menu.
5	BACK	Press to cancel current operation or return to the previous page.
6	Direction Key	- Press to change focus. - When on chart page, press to move the chart to desired location.
7	FUNC	The FUNC button can be customized by the user by going to system settings.
8	GOTO	Press to select a data to quickly begin a navigation task.
9	POWER	1) *Short Press* to adjust the screen brightness and device volume. 2) *Long press* to power off the device.
10	MOB	1) *Short press* to quickly create mob point. 2) *Long press* to jump to SOS page.
11	Card Slot	Supports one SIM card and up to two Micro-SD memory cards

Table 1 - Front panel button description.

Ports and Interfaces

The Figure 3 shows the schematic of the location of the ports and interfaces of the M10, followed by a description in Table 2.

AIS Antenna

GNSS

Marine LCD Monitor

Line Length: 8m

Line Length: 2m

Black   Red
DC10V-36V

1 CAN-H
2 12V
3 GND
4 GND
5 CAN-L

Line Length: 1.2m

1
2
3
4
5
6
7
8

1 HPOR
2 HPOL
3 HP-DET
4 GND
5 ALARM-NO
6 ALARM-COM
7 ALARM-NC

1 Brown NMEA0183_1 (TX1-)
2 Orange NMEA0183_1 (TX1+)
3 Yellow NMEA0183_2 (RX2-)
4 Green NMEA0183_2 (RX2+)
5 Blue NMEA0183_3 (TX3-/RX3-)
6 White NMEA0183_3 (TX3+/RX3+)
7 Black NMEA0183_4 (RX4-)
8 Red NMEA0183_4 (RX4+)

Figure 3 - M10 ports and interfaces schematic.

M10
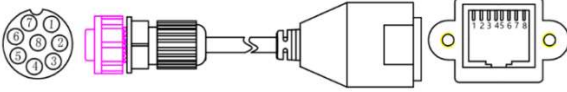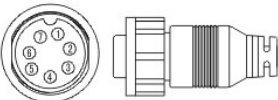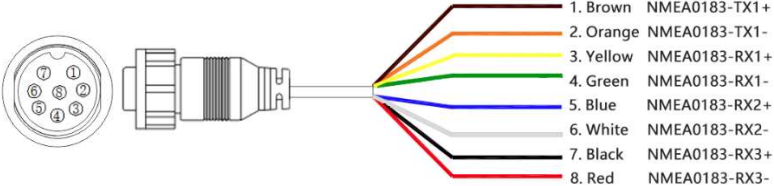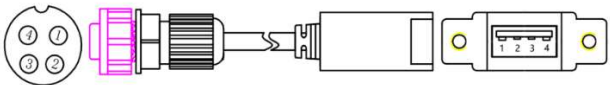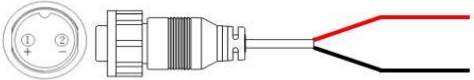
Interface	Description
GNSS Antenna Interface	Connects to GNSS antenna
Video Camera Interface	Connects to Video Camera
4G Antenna Interface	Connects to 4G antenna
AIS Antenna Interface	Use to connect AIS antenna
Network Interface (8 pin)	1. DA+ 2. DA- 3. DB+ 4. DB- 5. DC+ 6. DC- 7. DD+ 8. DD-
HDMI Interface	Connects to Monitor
Audio and Alarm Output Interface (7 pin)	1. HPOR 2. HPOL 3. HP-DET 4. GND 5. ALARM-NO 6. ALARM-COM 7. ALARM-NC
NMEA 0183 Interface (8 pin)	1. Brown NMEA0183-TX1+ 2. Orange NMEA0183-TX1- 3. Yellow NMEA0183-RX1+ 4. Green NMEA0183-RX1- 5. Blue NMEA0183-RX2+ 6. White NMEA0183-RX2- 7. Black NMEA0183-RX3+ 8. Red NMEA0183-RX3- The Default output messages are: RMC, GGA, VTG, GLL, ZDA, XTE and APB. They can be set by going to: *Settings → Advanced settings → NMEA-Output*
USB Interface	1. 5V 2. USB-DN 3. USB-DP 4. GND
NMEA 2000 Interface (5pin)	1. CAN-H 2. 12V 3. GND 4. GND 5. CAN-L
Power Interface	1.Red DC+ 2.Black DC-

Table 2 - Ports and communication interfaces description.

Installation Instructions

GNSS Antenna Installation

The GNSS antenna should be mounted in an unobstructed view of the sky, and at a distance of at least three meters away from other interferences such as the S-band radar, INMARSAT antenna and other high power antennas. Measure the A/B/C/D Reference distances to set up the ship's static parameter as shown in Figure 4.
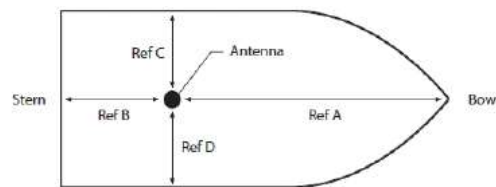
Figure 4 - GNSS Antenna Installation.

AIS Antenna Installation

The AIS antenna operates in the Very-High frequency (VHF) range. The sections below discuss the horizontal and vertical installations.

Horizontal Installation

For horizontal installation, ensure the following guidelines:

- VHF antenna should be installed in the level 360º without any obstacles.
- VHF antenna should be kept more than 2 metres away from conductor structure in horizontal position. It also should be kept more than 3m away from the transmitted beam of radar and high power source antenna.
- VHF antenna should be kept more than 10m away from other VHF antennas in the same horizontal plane.
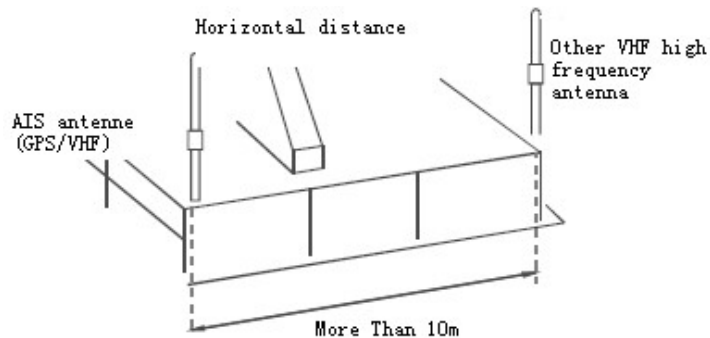
Figure 5 - Horizontal VHF antenna installation guidelines.

Vertical Installation

The VHF antenna must be mounted at least two meters away from other VHF antenna in the vertical direction as illustrated in Figure 6.
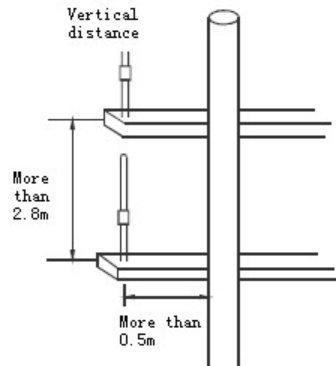
Figure 6 - Vertical VHF antenna installation guidelines.

Operation and Settings

Homepage

When the equipment is powered on, press and hold the **Power button** to arrive at the homepage. Slide left and you will arrive at the page shown in Figure 7 with the status bar shown in the top row. The next sections describe the icons in the homepage.

Introduction to the status bar

1 – Shows the GNSS position solution as either *valid*, *invalid* or *no position*.

2 – Displays the current latitude and longitude coordinates of the ship, or the last known coordinates when the GNSS position is not available.
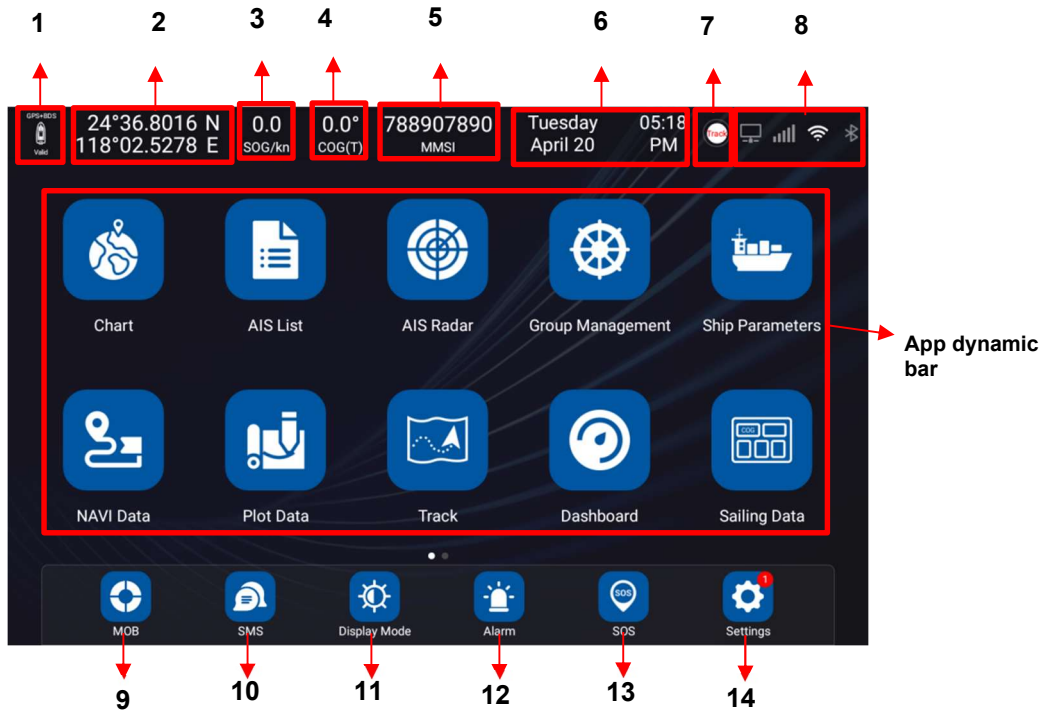
Figure 7 - Status bar display description.

3 – SOG, displays the current sailing speed of the ship.

4 – COG, displays the current course of the ship.

5 – MMSI, display the MMSI of the ship.

6 – Displays the date and time.

7 – Shows track record status and current track record data capacity.

8 – Ethernet connectivity/Cellular mobile signal WiFi signal/ Bluetooth signal, click to enter the settings page, white colour means connected, while grey is not connected.

App dynamic bar introduction

The Center icons represent the following:

- Chart page, click *Chart* to go to the chart page.
- AIS List, click to view the AIS list, display the AIS target information of the ship and its surrounding areas, and display the latest 1000 AIS target information.
- AIS Radar, click to enter the AIS radar page, where you can view the number of AIS within the set field of vision, static information of selected target, navigation data and operation.
- Group Management. Group management can monitor the dynamics of ships.
- Ship Parameters. Ship parameter management includes differential setting, navigation parameter setting and ship static parameter setting.
- NAVI Data. Click to enter the navigation data page, where you can select waypoint and route data to quickly call navigation, edit and add navigation data.
- Plot Data. Click to enter the plot data page, which includes drawing Points, lines and polygon. You can select to view, edit and create new Plot data.
- Track. Click to enter the track page, where you can select record, view, edit and add a new track.
- Dashboard. Click to enter the digital dashboard page to support the customized display of COG, HDT, SOG, BRG, Lat/Lon, DPT, Wind, TEMP,XTE and other data.
- Sailing Data. Click to enter the Sailing Data management page, support the customized display of ship SOG, COG, HDOP, VDOP, HDT, DPT, Wind, TEMP,XTE, RNG,BRG, ETA and other data.

Swipe left to access the next page information below:

- Tide. Click to enter the tide page to view the tide time and tide height information of the site.
- GNSS. Click to enter the GNSS ephemeris, select the GNSS source and location mode to view the ephemeris.

App fixed column introduction

9 – MOB. Displays the record of mark points, view MOB mark records

10 – SMS. View received and sent short messages, add contacts and common words.

11 – Display mode. View the chart display mode, and set sound and screen brightness.

12 – Alarm. Click to enter the alarm setting page, including the alarm setting of the ship, AIS alarm setting and alarm log, and the main alarm switch.

13 – Enter the SOS page, you can quickly broadcast the alarm and distress information through AIS.

14 – Settings, click to enter the system settings page, including version Update, Network, Func & cursor, NMEA, device Settings and hardware information.

Message notification popup

- Information window (if pop-up window appears)

    (a) Click the drop-down icon to view all alarm or SMS messages.

    (b) Click the pull-up icon to put away the alarm or SMS message.

    (c) Left slide alarm information can select to confirm the current alarm. Click the close button in the upper right corner to confirm all the current alarm information. When the alarm is triggered again, the alarm window will pop up again.

Figure 8 - Message notification popup.

    (d) The number in the upper right corner of the icon is the number of received alarm messages or SMS messages.

    (e) Alarm types include, overspeed, arrival, XTE, anchor watch, plotting point/line/polygon and AIS CPA, area, ship type Alarm.

Settings

On the Home page, click *Settings* to go to the settings page.
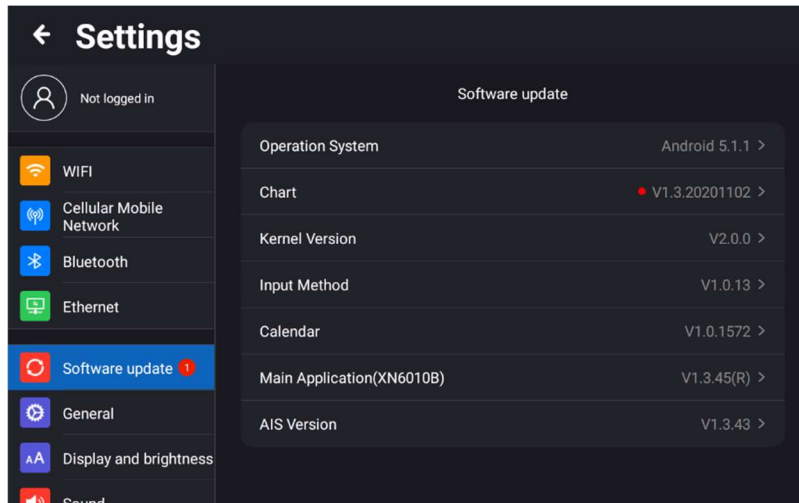
Figure 9 - Settings page.

User login

On the home page, click *Not logged in* to enter the user login page.

- For users **without** a registered account, click *Register Now* to enter the registration page, input the mobile phone number, password and confirm the password. Then click on *Get code*, input the code received via SMS and click *Register*, to complete the registration and log in.
- For users with an existing account, directly enter the user's cell phone number and password on the login page, and then click login, or verify the quick login by scanning the QR code or SMS. If you forget your password, click forget password to retrieve it.

Note that users need to connect to the internet via (WiFi or mobile network) to log in.

WIFI

Set the WiFi ON/OFF. When it is set to on, select the wireless network you want to connect to and enter the password according to the prompt to connect. If the network you are trying to connect to is not displayed in the list, you can select *Add network* and enter the network name to add it to the list of networks.

Cellular Mobile Network

Set the cellular mobile network ON/OFF, and display the SIM (4G) card operator, data package and usage, SIM card number and usage status, IMEI and ICCID and other information.

Bluetooth

Set the Bluetooth ON/OFF. When it is set to on, search for nearby Bluetooth devices, tap the Bluetooth device to be connected for pairing, prompt the Bluetooth pairing request, display the pairing device and pairing code, tap pairing, the other party's consent is required to connect and pairing is successful.

Ethernet

Set the Ethernet ON/OF. When successfully connected, the IP address, netmask, gateway, DNS information will be displayed after connecting to the network.

Software update

Click *Software update* to view the current software version, chart, input method, calendar, main application and AIS version, online support and local SD card upgrade.

Online Upgrade

Connect to the internet, click to check if there is a new version, select the new version, click to start the update, pop up the upgrade menu, select *Update Now → Start Download → Download Complete → Prompt New version is ready now*, *do you want to update right now → Install now → After the installation is complete*, the device will automatically reboot.

SD upgrade

[1] Format the memory SD card to FAT32 format

[2] Download upgrade package

Get the latest download link from www.comnav.com to download the upgrade program, including the main Application, weather, calendar, input method, chart data and other upgrade program.

[3] Unzip File

Unzip the update file to the memory SD card and place the memory SD card into the card slot of equipment.

[4] Update

After inserting the SD card into the card slot, the SD Card Update menu will appear automatically on the version information page. Click the **SD Upgrade** menu button to start updating.
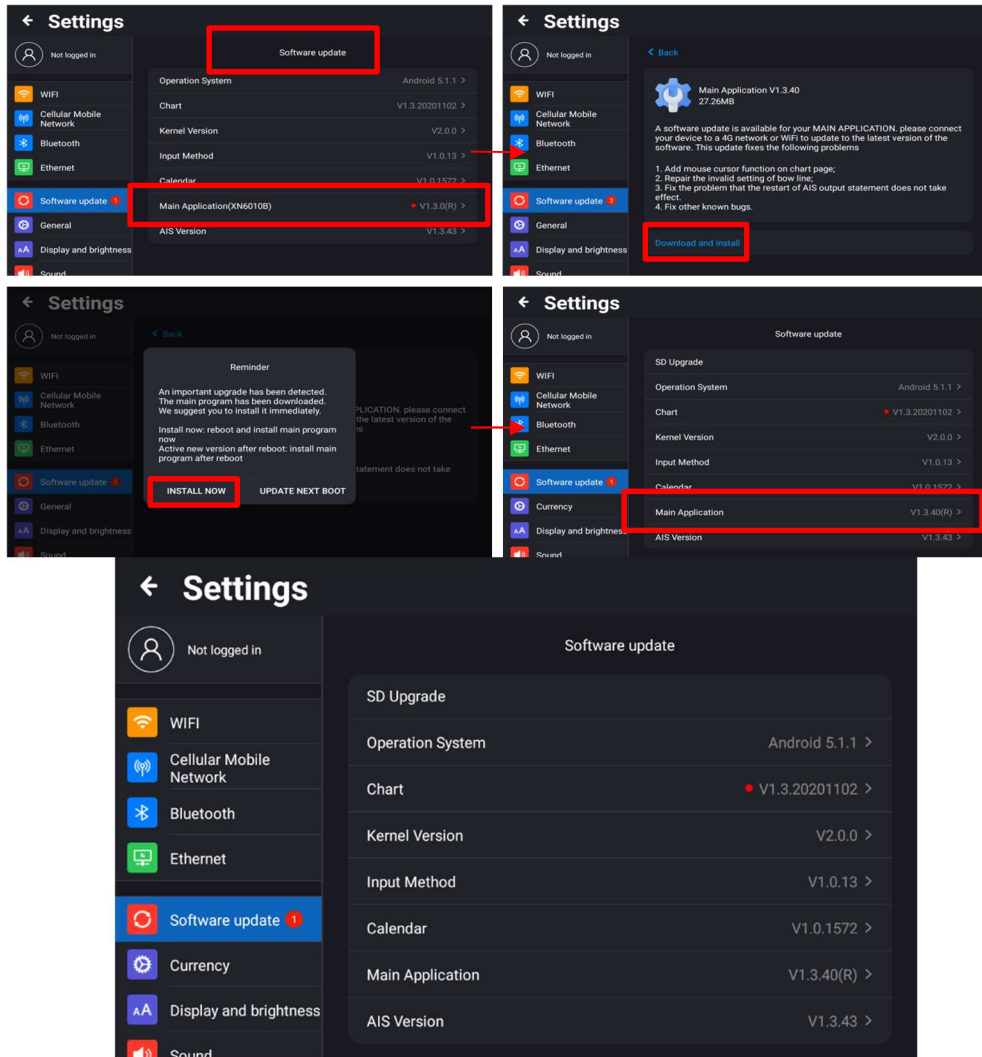
Figure 10 - Settings showing SD upgrade, Software update and other settings.

Notice:

1. When the memory card is inserted into the device, the **SD Upgrade** menu will be displayed on the device settings page.

2. Click **SD Upgrade** and the device will automatically detect whether there is a new version. Click **Confirm** to open the installation prompt box. Click **INSTALL** and wait for the installation prompt to succeed.

Currency

1. Language. Choose from: English, Spanish, and Simplified Chinese

2. Date Format can be set.
3. Time Format: 12hours, 24 hours can be set.
4. Time Zone: Local time zone can be set.
5. Hardware Information:
   Click **Hardware Information** to view the device-related hardware information: System, Kernel version, CPU, CPU speed, RAM ,FLASH, Video engine, Keyboard, Touch panel, Size, Resolution, Brightness, Viewing angle, Power voltage, Power consumption, GNSS, Audio, Micro SD card slot, Bluetooth, WiFi, Input, Output, Lan Network, NMEA-2000, Operating temperature, Standard, Frequency, Bandwidth, Modulation, Data rate, Number of AIS transmitter, Number of AIS receiver, Transmit power, Rx sensitivity.
6. Storage: you can view device storage related new information, including internal storage, available, Apps (App data and media content), pictures, videos, audio, downloads, cached data.

Display and brightness

The screen brightness adjustment range is from 0 - 100%. When the screen brightness is lower than 25%, the brightness value of the restart device is automatically set to 40%.

Sound

- Volume: equipment volume range 0-15.
- Touch tone: you can set the sound button ON/OFF.

Notice

You can set the alarm message, short message and AIS message ON/OFF. After the notification message is closed, the message notification pop-up window will be cancelled, and the message reception and voice reminder will not be affected. The received message can be viewed in the **SMS** APP.

Advanced settings

Custom keys

The **FUNC** key functions can be set, including setting track on/off, track color switch, alarm on/off, chart full screen switch, and screen on off switch for setting.

(A) Track on/off: Press the **FUNC** key to quickly switch on/off track record.

(B) Track color switch: When recording a track, press **FUNC** to switch the track color.

(C) Alarm on/off: Press **FUNC** key to quickly turn on or off all set alarms, including sounds and prompts.

(D) chart full screen switch: Press **FUNC** to quickly turn on or off the full-screen chart mode.

(E) Screen on/off switch: Press **FUNC** key to turn off the screen or increase brightness.

NMEA

You can view signal input and output information, select different channels to view input and output data, you can set the baud rate of each channel, and configure the NMEA0183_3 port as input or output.

1. Input

   Click **Input** to enter the input signal channel setting page. Click the serial port box on the right of **Signal Channel** to select input channels, GNSS&AIS, NMEA 0183_2, NMEA 0183_3, NMEA 0183_4, and you can directly check the input sentence on the page.

Note:[NMEA0183_3] is a configurable channel, and input or output can be set in *Advanced Settings→NMEA 0183_3 Configuration*.

Click *Pause* in Signal check out to pause the input sentence screen to view the input sentence, click *Reset* to refresh the sentence and re-enter.

2. Output

- Click *Output* to enter the output signal channel setting page.
- If *NMEA0183_3* is set as output, the output page signal channel has NMEA0183_1 and NMEA0183_3 to choose from.
- Click the *Protocol Version* selection box to set the protocol version, including: V2.00 (default), V3.01, V4.10.
- Click the *Checksum* switch to turn the check code of the sentence on or off.
- Clicking *Output* will pop up all sentence types, you can set the sentence data on / off, and turn on or off the corresponding output sentence, including, AIS, APB, BOD, BWC, DPT, GGA, GLL, GSA, RMC, VTG, XTE, ZDA, etc.
- Click *Pause* in Signal check out to pause the output sentence screen to view the output sentence, click *Reset* to refresh the sentence and re-enter.

3. Baud rate

Click *Baud Rate* to set the baud rate of NMEA_0183 serial port: 4800/9600/19200/38400.

4. NMEA 0183_3 Configuration

You can be configured as input or output.

Speed and course Filtering

1. SOG Filtering: Speed can be set on/off smoothly.
2. SOG Filtering Setting: The setting range is 2.0 - 59.0, and the smooth value can be set according to the time operation needs. The speed change has a mitigation process. The larger the value, the slower the change.
3. SOG Burr: Setting range 0.5 - 10.0.
4. COG Filtering: Can set heading smooth on / off.
5. COG Filtering Setting: Setting range 2.0 - 59.0.
6. COG Burr: Setting range 59~360.

Unit setting

1. Distance Unit: Kn,Km/h can be set.
2. Speed Unit: Kn,Km/h can be set.
3. Depth Unit: m,fm,ft can be set.
4. Temperature Unit: ℃,℉ can be set.

Azimuth and magnetic declination

1. BRG: Set True north, and Magnetic north.
2. Magnetic Declination: Automatic or manual, manual setting range 0.0 ~ 179.9 ° W (E).

Screen Sharing

Connect the monitor to output the projection screen through HDMI, adjust the display position of the monitor to obtain the best display effect.

Chart

Once on the home page, click on *Chart* to view the chart page. The next section describes the operation of the chart indicators.

Chart Page Indicator Description

The labelled chart indicators are shown in Figure 11 along with their description below.
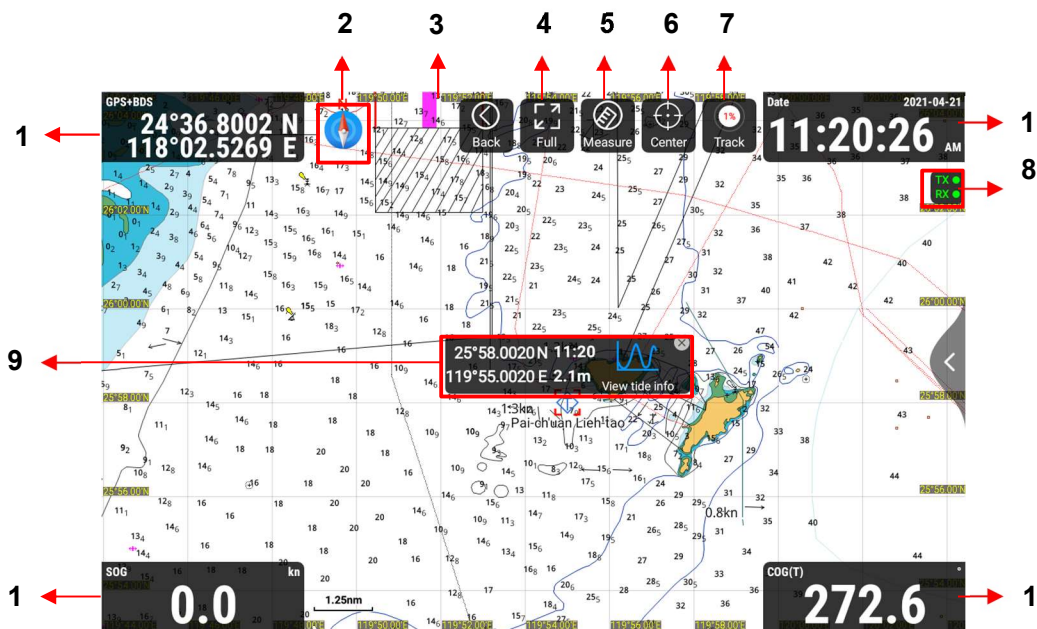
Figure 11 - Chart Indicator Description.

1. Data window: Independently sets and displays relevant data information, including Ownship Lat/Lon, Date, SOG COG, HDT, DPT, Wind, Temp and MMSI/NAME.
2. Compass: Sets the North up, Heading/Course Up, and route up
3. Back: Returns user to the home page.
4. Full: Click to enter the full screen mode of the chart, the chart page only displays the layer, and does not display the data window and other display items.
5. Measure: Two or more points can be measured on the chart to show the distance and bearing between measurement points.
6. Center: Automatically centers the ship, in any case, quickly refreshes the chart and displays the position of ownship in the center of the screen.
7. Track: Controls the playback of track recording.
8. AIS Signal Light: Shows Tx and Rx signal light, the signal light includes three states: normal working state is green colour, instant Tx / Rx state is blinking green/gray, and failure/non-working state is gray and crossed.
9. Tide: Selects a tide site, you can choose to view the tide table to quickly enter the tide data page.

Data Window

The data window displays relevant data information, including the ownship Lat/Lon, Date, SOG COG, HDT, DPT, Wind,Temp and MMSI/NAME.

Compass

Click on the *Compass* icon to select one of the three modes: North up (default), Heading/Course up, and Route up, as shown in the Figure 12.
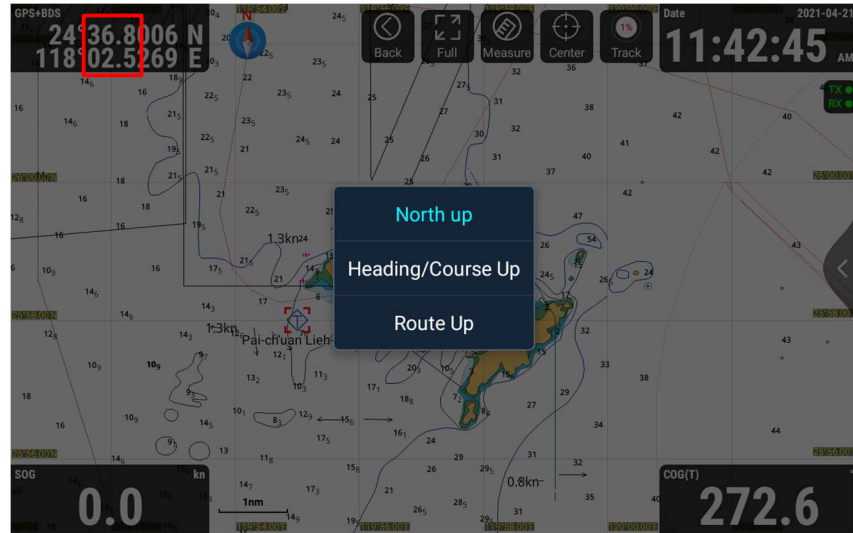
Figure 12 - Compass Direction.

The three directions are described below and illustrated in Figure 13.

[1] North up: The chart is oriented with the north pointing up.

[2] Heading/Course up: The chart is displayed with the ship's heading/course up. When there is heading data, the heading up mode is used, and when there is no heading data, the course up mode is used.

[3] Route up: The chart is displayed upward with the route pointing up.

(a)

(b)

(c)

Figure 13 - Compass Direction Settings: (a) for North-up, (b) for heading/course-up and (c) for Route-up

Measure

Click **Measure** to start measuring distances and bearings. Click on the chart as the starting point for distance measurement. Continue to click to automatically measure the distance and bearing between adjacent measurement points.

[1] Distance: Distance between two points.

[2] Bearing: Measures the bearing of two adjacent points.

[3] Total distance: The total distance between the measured points will be displayed on the Operation box as shown in Figure 14.

[4] Operation box: Select *Delete* to delete the current measure point, select *Reset* to clear all the measure points, click the **Measure** button to exit the measurement.

Figure 14 - Chart showing operation box.

Center

Click on the icon titled **Center** to refresh the chart, and display the position of the ownship in the center of the screen.

Track

1. Click the **Track** icon to start recording the track, then click once again to stop the recording.
2. Long press the **Track** icon to pop up the track window as shown in Figure 15. Enter the track name, select Save, complete the new creation and start recording, select Back to cancel the track recording.
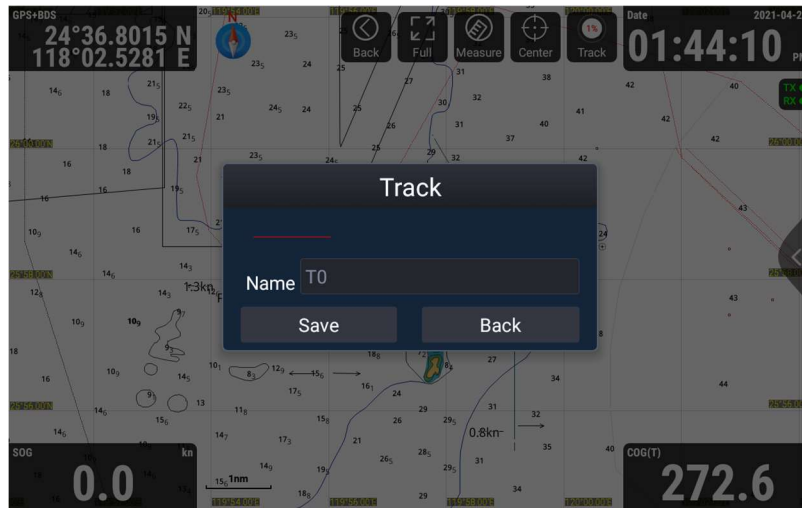
Figure 15 - Create New Track. Enter Track Name.

Add Waypoint

On the chart page, long press on the map the location where you wish to create a waypoint, and the information window as shown in Figure 16 (a) will pop up. Click *Add*, and the information editing window shown in Figure 16 (b) will pop up.

(a)

(b)
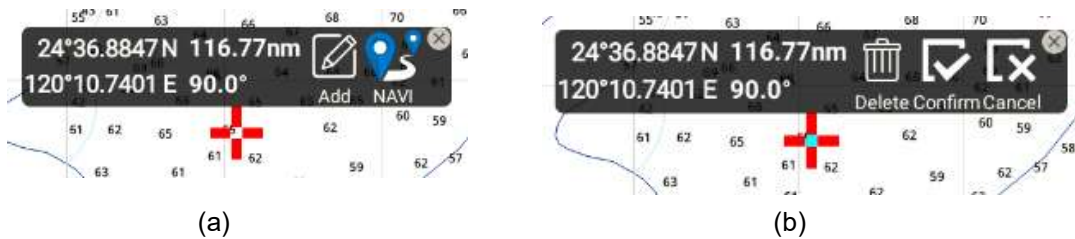
Figure 16 - Waypoint Creation.

1. Click **Confirm** to create a waypoint at this location and enter the relevant data as shown in Figure 17.
2. Click **Delete** to exit the operation of adding the waypoint.
3. Click **Cancel** to exit the point editing and return to Figure 16 (b).
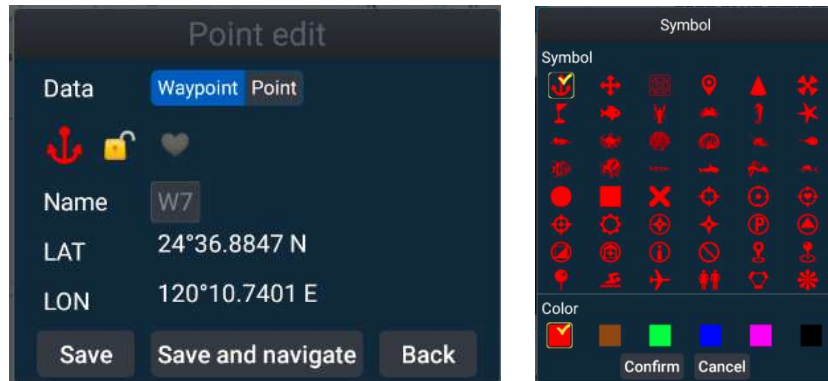
Figure 17 - Point edit.

Once at the point edit window, you can edit the attributes of the new point as follows:

1. Select the data type as waypoint.
2. Clicking on the Red symbol icon and the symbol editing window shown in Figure 17 will open. There is a total of 48 symbols and 6 different colors.
3. Click the lock icon to lock or unlock the newly created waypoint data. The locked point cannot be deleted directly.
4. Click the heart icon to set the focus or not to focus, and the focused waypoint will be placed in front of the list.
5. Click on the name edit to enter the waypoint name.
6. After editing the waypoint, you can choose to save, save and navigate or go back to the chart page, The details are as follows:
   (a) Select **Save** to save the new waypoint to the navigation data list.
   (b) Select **Save and Navigate** to save the new waypoint and start navigating with that point as the destination.
   (c) Select **Back** to cancel editing, the waypoint will not be saved.
   (d) On the chart page, click on the waypoint to be edited to perform **Edit**, **NAVI** or **Delete** operations, as shown in Figure 18.
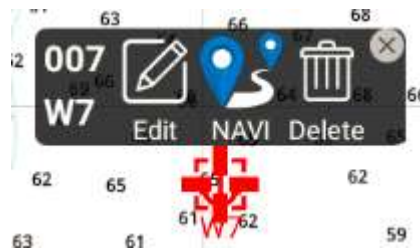
Figure 18 - Waypoint edit page.

Add Route

On the chart page, long press the desired location where you want to add a route, and the information page shown in Figure 19 will pop up. Click the **Add** Icon to confirm the position of the first route node. Click the second position on the map to confirm the second route node, and so on multiple clicks to add multiple nodes. After setting the required nodes for the route, click **Confirm** to enter the line editing page as shown in Figure 20.
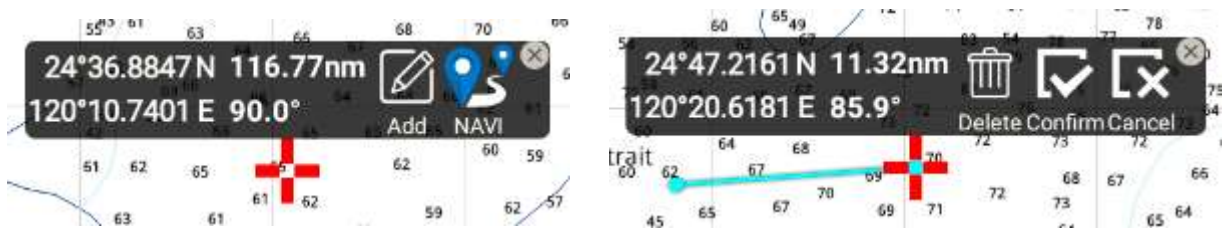
Figure 19 - Add page and route.
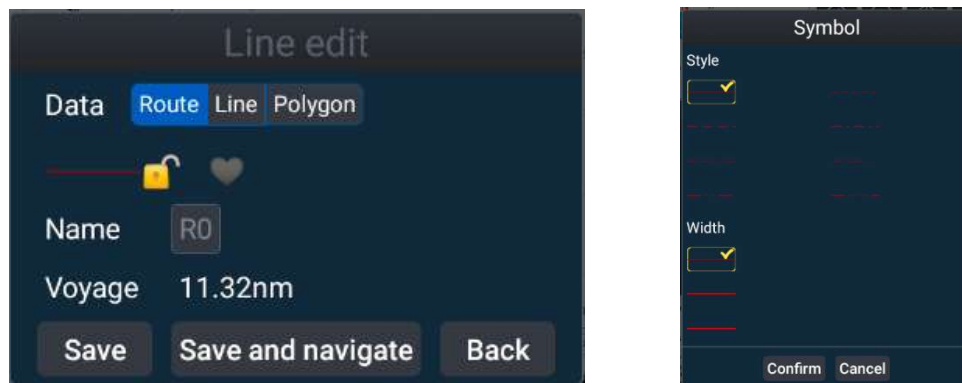
Figure 20 - Line edit and symbol edit pages.

The line edit window, shown in Figure 20, allows one to edit the attributes of a new route, as described below:

1. Select the data type as Route.
2. Click the *Red* line symbol to provide: 8 line styles, 3 line widths and 6 colours for line style settings.
3. Click the lock icon to set to lock or unlock the newly created route data. The locked route cannot be deleted directly.
4. Click the heart icon to set the route as a favorite. The favorited route will be placed on top of the list. One more click on the heart to remove the route from the favourite list.
5. Click on the *Name* to enter the route name.
6. After editing the route attributes, you can choose to save, save and navigate, or back to the chart page, as detailed below.
   (a) Select **Save** to save the new route to the navigation data list.
   (b) Select **Save and Navigate** to save the new route and start navigating with that route as the destination.
   (c) Select **Back** to cancel editing, and the route will not be saved.
   (d) On the chart page, select the route to be edited, and you can also perform the operations of **Edit**, **NAVI**, **Add note**, and **Delete**, as shown in Figure 21.
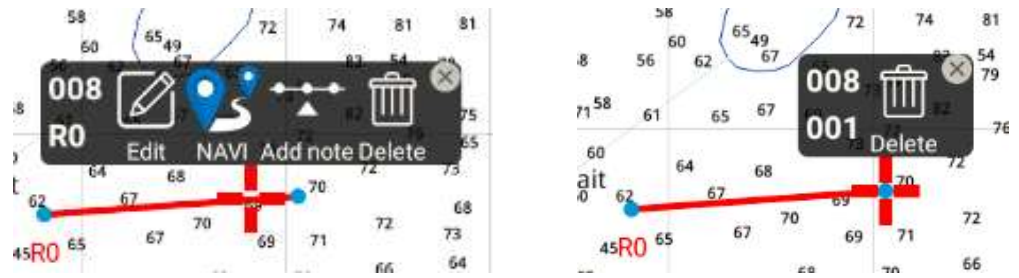
Figure 21 - Edit Route Window.

Waypoint navigation page

When the navigation type is waypoint navigation, the display window on the chart page is shown in Figure 22.
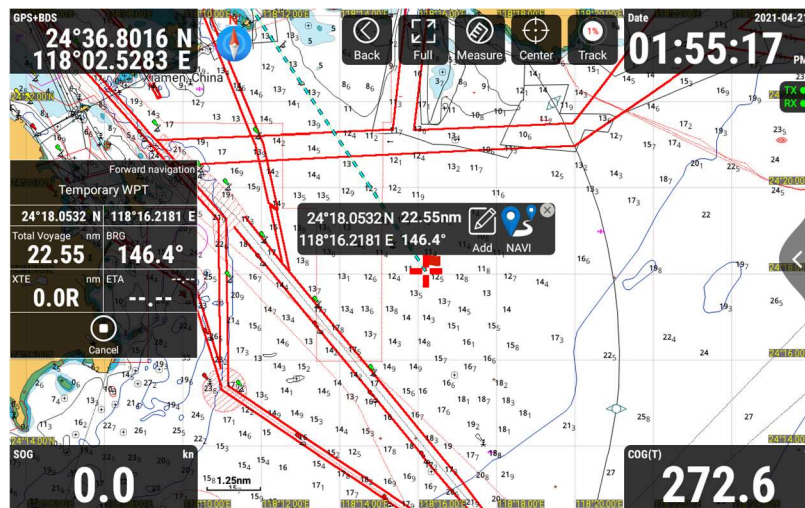
Figure 22 - Waypoint Navigation.

The Figure 22 shows the ownship's latitude and longitude, total voyage, bearing (BRG), cross track error distance (XTE), estimated arrival time(ETA).

Route navigation page

When the navigation type is route navigation, the navigation window displays own ship's latitude and longitude, total voyage, bearing (BRG), Remaining sailing time (TTG), Remaining voyage (VOG), XTE, and estimated arrival time (ETA).

Chart page operation

On the chart page, swipe to the left or press the physical **MENU** button to bring up the function menu items as shown in Figure 23, which includes the *chart data source switch, track, navigation data, MOB, history navigation, plot Data, display setting*.

A description of each of the above items is given below.
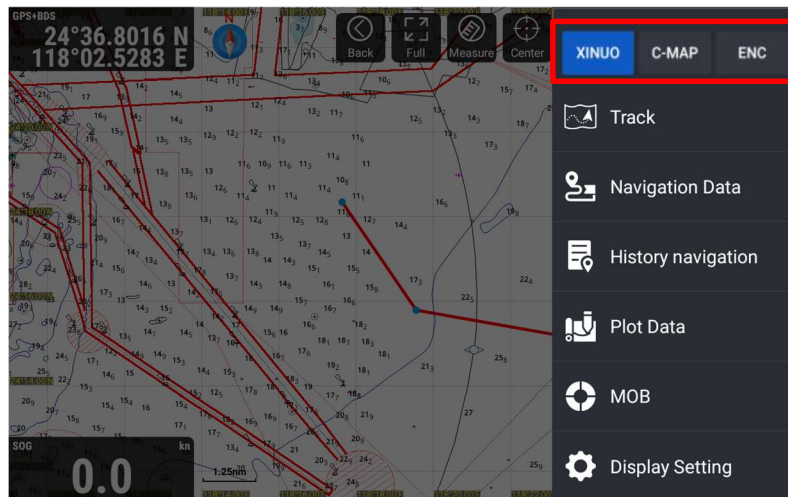
Figure 23 - Function Menu Item.

Chart data source switch

Supports the installation and display of XINUO-MAP, C-MAP (MAX), and ENC charts. If the charts have been installed, you can click the corresponding data source to switch between charts.

Note that when selecting C-MAP, make sure of the the following

- The C-MAP card is MAX format.
- The C-MAP MAX card is inserted on the first card slot of the right side.

Track

Click the *Track* icon to show the track list.

Navigation Data

Click on the *Navigation Data* icon to show the navigation data list. See Section **Navi Data** for more information.

History navigation

Click on the *History Navigation* to show the history navigation list. For more details see Section **History Navigation** for more information.

Plot data

Click *Plot Data* to enter the list of plotting data. For more details, please refer to section **Plot Data**.

MOB

1) Click *MOB* to show the MOB list, please refer to the **MOB** section for details.
2) Press the physical button **MOB** to quickly add a MOB point at the current ship position.

Display setting

Click on *Display Setting* to arrive at the page shown in Figure 24 where you can choose different display modes such as mode selection, chart display, ownship display, AIS target display, as well as AIS information window, my data, window button and advanced settings.
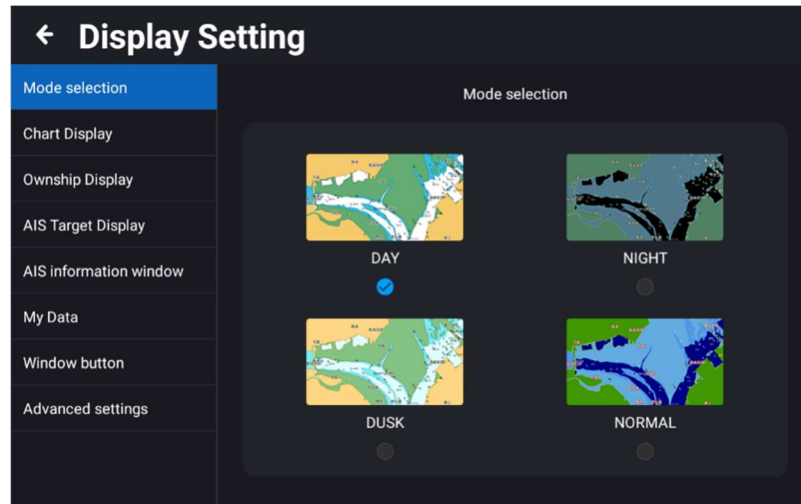
Figure 24 - Display Setting.

A description of these settings is given below:

Mode selection

Click *Mode Selection* to set the chart display mode, and choose between: day, night, dusk and Normal modes.

Chart display

Click on *Chart Display* to view the display setting page of the chart screen, where:

1. Chart direction: Sets the chart direction to North up, Heading/Course up, and Route up.
2. Tide Station Display: Can be set ON/OFF. When set to on, the tide station will be displayed on the chart.
3. Water depth mark: Can be set ON/OFF. If set to on, the water depth line will be displayed on the chart.
4. Fishing area: Can be set ON/OFF. if set to on, the fishing area will be displayed on the chart.
5. Latitude-longitude grid display: Can be set ON/OFF. If set to on, the latitude and longitude grid lines are displayed on the chart.
6. Compass overlay: Can be set ON/OFF. When set to on, overlay compass is displayed on the chart.
7. Text size of place names: Sets the font size of the place names displayed on the chart. Sizes small, medium and large are available.
8. Hazard display: Hazard display switch, the display level can be set to: close/3nm /1.5nm/1nm/0.75nm/0.5nm.
9. Subsea obstruction: Subsea obstruction display switch, the display level can be set to: close/3nm/1.5nm/1nm/0.75nm/0.5nm.

10. 10m depth contour: 10m depth contour display switch, display level can be set to: close / 3nm / 1.5nm / 1nm / 0.75nm / 0.5nm.
11. 20m depth contour: 20m depth contour display switch, display level can be set to: close / 3nm / 1.5nm / 1nm / 0.75nm / 0.5nm.
12. Miscellaneous line display: Miscellaneous line display switch, the display level can be set to: close / 3nm / 1.5nm / 1nm / 0.75nm / 0.5nm.
13. The line aids to navigation: Navigation indicator line display switch, the display level can be set to: close / 3nm / 1.5nm / 1nm / 0.75nm / 0.5nm.
14. Boundary: Boundary display switch, display level can be set to: close / 3nm / 1.5nm / 1nm / 0.75nm / 0.5nm.
15. Cable: Cable display switch, display level can be set to: close / 3nm / 1.5nm / 1nm / 0.75nm / 0.5nm.
16. Oil and gas pipeline: Oil and gas pipeline display switch, the display level can be set to: close / 3nm / 1.5nm / 1nm / 0.75nm / 0.5nm.
17. Yangtze lane: Channel display switch, display level can be set to: close / 3nm / 1.5nm / 1nm / 0.75nm / 0.5nm.
18. Color filled between the depth contour: The display content of the water depth area can be set to: low water line, 2.5 depth contour, and 5 depth contour.
19. Color filled between the depth contour display: Water depth area display switch, display level can be set to: close / 3nm / 1.5nm / 1nm / 0.75nm / 0.5nm.

Ownship Display

Click ***Ownship Display*** to view the own ship display setting page. The specific settings include the following.

- Ownship Symbol: The display symbol of ownship can be set to any of the five styles shown in Figure 25.
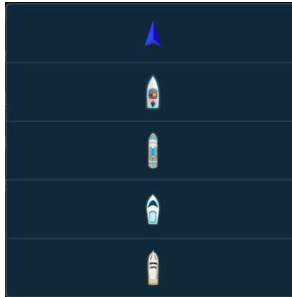
Figure 25 - Ownship Symbol.

- Heading line: Can be set to close, the heading line display length (short, medium, long) and the time position vector to 1/3/6/12 minute position vectors. The position vector line can be calculated according to the current speed multiply by time.
- Course line: Can be set to close, course line display length (short, medium, long) and the time position vector to 1/3/6/12 minute position vectors. The position vector line can be calculated according to the current speed multiply by time.
- Position tracking: Can be set to ON/OFF. If set to on, the ship position will be displayed on the screen according to the **Display Position** setting.
- Refresh position: When **Position tracking** is set to on, select screen center, and refresh the position of the ship in the center of the screen every 10 seconds.

AIS Target Display

Click **AIS target display** to view the AIS target display setting page. A description of the AIS target display settings is given below:

1. Heading line (HDT): Choose to turn off the heading line display, set the display length (short, medium, long) and time position vector line to 1/3/6/12/24 minute position vector. The time position vector line refers to the expected walking length within the set time.
2. Course line (COG): Choose to turn off the bow line display, set the display length (short, medium, long) and time position vector line 1/3/6/12/24 minute position vector.
3. CPA line: Turns ON/OFF the display of the CPA line between the ship and the target ship.
4. AIS Target Track Display: The targets for displaying trails can be set to: All targets, Class A targets, Class B targets, and Favorite AIS targets.
5. AIS Target Track Length: AIS target track length can be turned ON or OFF and the display duration can be set. The display duration can be set to 3/6/12/24 minutes.
6. Lost time: If the AIS vessel does not update the information within the set unupdated blanking time, the vessel will be automatically blanked from the chart and the list. The duration can be set to either 6 or 12 minutes.

AIS information window

A description of the AIS Information Window is given below:

1. AIS target display: Can be enabled/disabled to display/hide all AIS ships on the chart. See Figure 26.
2. Display ownship: Can be enabled/disabled. When enabled, it displays ownship's AIS information.
3. AIS ship information window style: Can be either set as *Bar Display Window* or *Card Display Window*. See Figure 26 for illustration.
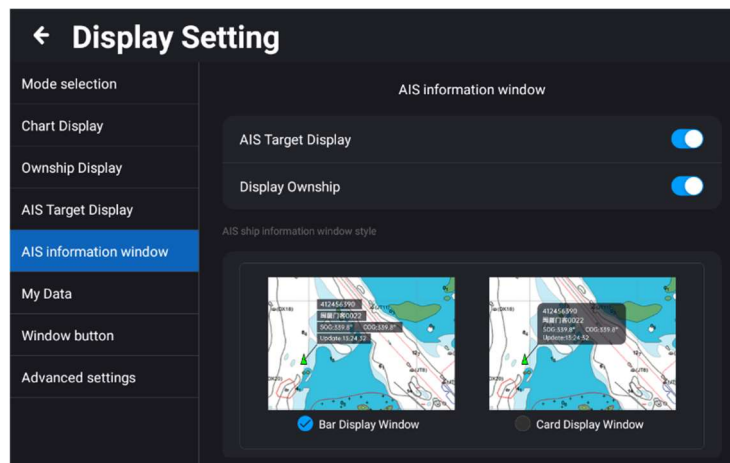

Figure 26 - AIS Information Window.

4. AIS ship information display target: Sets the AIS vessel related information display target on the chart page, displays all AIS targets' data view, displays class A/B targets' data view, displays data view of targets that you may encounter, and displays favourite targets' data view.

5. AIS ship information display Mode: Specific display modes can be selected, including custom, auto and simplified display, custom display mode, self-definable display AIS information display content, auto display. According to the size of the display, the window can be adjusted to streamline the display of ship name, course and speed, simplified display, only display the name and speed of the ship.

6. Information display content: Only when the AIS ship information display mode is set to custom mode, the information display content is displayed, and the displayed content can be selected, including MMSI, ship name, nationality, national flag, course, heading, and bearing, speed, distance, DCPA, TCPA, latest update, as shown in the Figure 27.
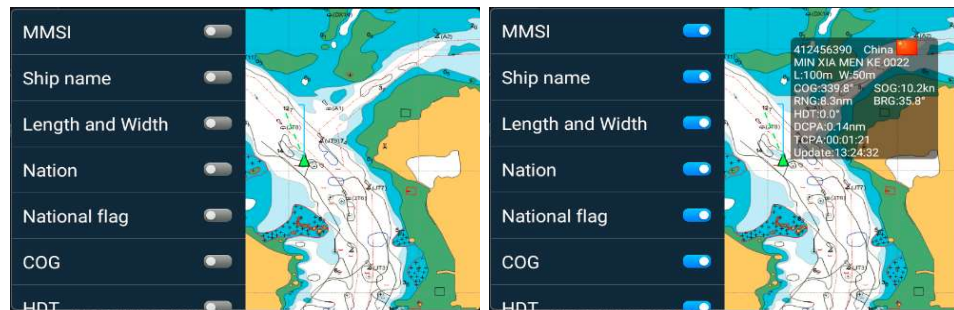
Figure 27 - Information display content.

My Data

Click *My Data* to enter the **My Data** Settings page. The specific settings are shown below.

1. **NAVI Data Display Scale**: Sets the navigation data to display the level and switch on the chart, setting items selection: Close/25nm/10nm/5nm/3nm/1nm/all.

2. **NAVI Data Display contents**: Sets the navigation data to display symbols, names, symbols and names on the chart, setting items, symbol / symbol & Id / symbol & name / symbol & Id & name.

3. **Track Display Scale**: Sets the track display level and master switch on the chart, setting items selection: Close/25nm/10nm/5nm/3nm/1nm/all.

4. **Track Display contents**: Track display content, set the track to display symbols, names, symbols and names on the chart, setting items, symbol / symbol & Id / symbol & name / symbol & Id & name.

5. **Plot Data Display Scale**: Plotting data display level, set the plotting data display level and switch on the chart, setting items selection: Close/25nm/10nm/5nm/ 3nm/1nm/all.

6. **Plot Data Display contents**: Sets the plotting data to display symbols, names, symbols, and names on the chart. Setting items, symbol / symbol & Id / symbol & name / symbol & Id & name.

Window button

Opens or closes the chart page window buttons, including upper left data information window, upper right data information window, lower left data information window, lower right data information window, full, measure, center, track and TX/RX signal indicator.

Advanced settings

1. **Cursor view content**: Includes data information operation items. When *Data Information and Operation Items* is selected, the selected data number, name, and operation item cursor information, will be displayed when operating on the chart.
2. **Cursor auto hide**: Sets the time to automatically hide the chart cursor. The options are: cursor is visible (not hidden), and hide for 10/30/60 seconds.
3. **User layer display**: User layer display switch.
4. **User layer data setting**: User layer data can be imported according to user needs, Choose to import equipment using the memory card layer data.
5. **Chart marker layer top**: When the user layer display is turned on, turn on the nautical chart object layer top switch to display the nautical chart object icon on top of the user layer.
6. **Internal user layer data uninstall**: Choose to uninstall the user layer data imported into the device.
7. **Data export**: Export data to storage devices.
8. **Data import**: Import data to the device.

AIS LIST

AIS list page

On the home page, click on *AIS List* to view the AIS List page shown in Figure 28.
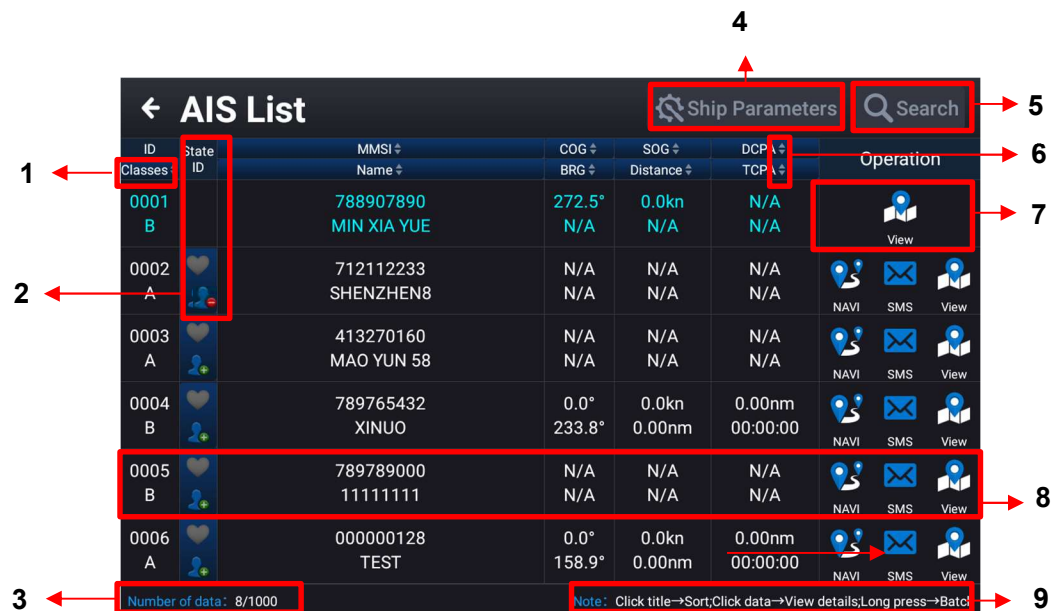
Figure 28 - AIS List page.

A description of the AIS list items is given below:

1. [1] **ID and Classes**: Click *Classes* to sort by category A, category B, base station or navigation aids.
2. [2] **State ID**
   a. Click the heart icon, the heart icon of the current ship turns red, and the current ship will move to the top of the list.
   b. Click the portrait icon, the status operation information serial port as shown in Figure 29 pops up, click **Add to group** or **Move out**, select the name of the group, and click **Confirm** to add or remove the

current vessel from the group for specific management operations, please refer to the **Group Management** section for more information.
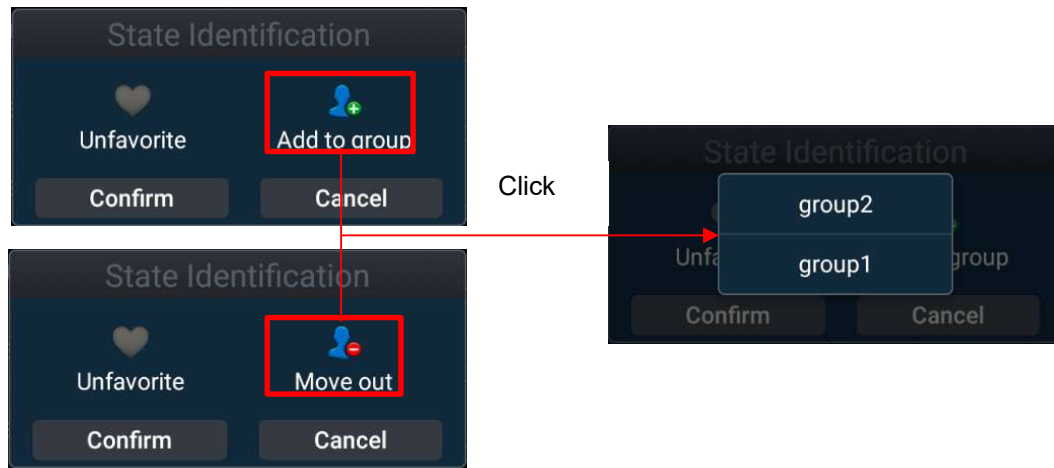
Figure 29 - AIS Portrait icon.

3. **Number of data:** AIS quantity display. The AIS list can hold up to 1000 ships.
4. **Ship parameters:** Click **ship parameters** to enter the ownship parameters page, including navigation parameters and static parameter settings.
5. **Search**: Click **Search**, enter keywords such as MMSI or ship name in the input box to search for ships in the AIS list.
6. **Sort**: Click [Classes], [MMSI], [Name], [COG], [BRG], [SOG], [Distance], [DCPA], [TCPA] in turn, the list can be switched from top to bottom Or sort from bottom to top.

    Note: You can only choose one sort, not multiple choices.

7. **Operation:**

    (a) **NAVI**: Select a ship and click the **NAVI** icon to open the chart and use the ship's position as the navigation destination.

    (b) **SMS**: Select a ship and click the **SMS** icon to open the AIS short message window to send AIS short messages to the ship.

    (c) **View**: Select a ship and click the **View** icon to open the chart and switch to the position of the currently selected ship.

8. **Data Information Window:** Click the data information corresponding to any ship to view the detailed information of the ship, as shown in the figure 30.
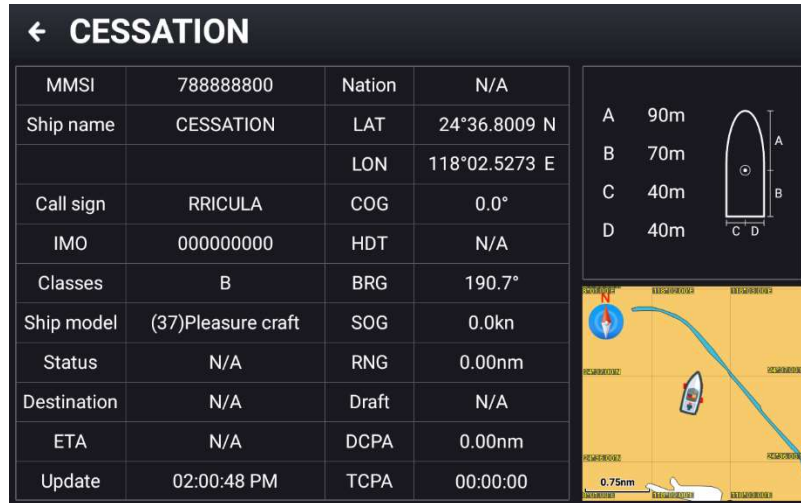
Figure 30 - Detailed Ship information.

9. **Note:**

    1. Click title to sort the AIS list.

    2. Click data, Click the data window corresponding to a ship in the list to view the detailed information of the currently selected ship.

    3. Long press the data corresponding to a certain ship in the list, as shown in Figure 31 to batch follow the list of ships, send AIS short message, add the group, follow, etc.
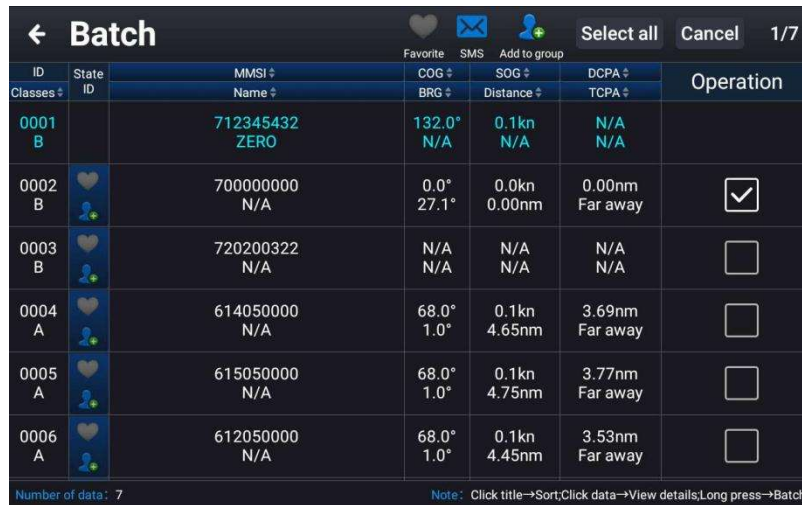

Figure 31 - Batch Operation.

Ship Parameters

On the AIS list page, Click **Ship parameters** to access the ownship NAVI and Static parameters settings as shown in Figure 32.

Figure 32 - Ship parameters.

NAVI Parameter

Click **NAVI Parameter** to enter the NAVI parameters as shown in the Figure 32, where you can set the maximum draft of the ship, the number of crew members, the navigation status (Under way using engine, At anchor, Not under command, restricted manoeuvrability, Constrained by her draught, Moored, Aground, Engaged in fishing, Under way sailing), destination, estimated arrival time. Click **write parameter** and the system will display a prompt that the parameter is successfully written.

Note that the maximum number of characters is 20.

Static Parameter

Click **Static Parameters** to enter the Static parameters as shown in the Figure 33. The parameters include the ship's MMSI, ship name, call sign, ship model (see Table 3 for specific ship type description), captain (sum of A and B) and ship width (sum of C and D), where:

- The distance A represents the distance from the bow to the position of the GPS antenna.
- The distance B represents the distance from the stern to the position of the GPS antenna
- The distance C represents the distance from the port to the position of the GPS antenna.
- The distance D represents the distance from the port to the position of the GPS antenna.

Note: The writing of static parameters requires professionals to complete the programming and programming software.

Figure 33 - Ship Static parameters.

number	ship model	number	ship model	number	ship model
0	Undefined	41	Hazardous HSC X	63	Hazardous Passenger ships Z
20	WIG	42	Hazardous HSC Y	64	Hazardous Passenger ships OS
21	Hazardous WIG X	43	Hazardous HSC Z	70	Cargo ships
22	Hazardous WIG Y	44	Hazardous HSC O	71	Hazardous cargo X
23	Hazardous WIG Z	50	Pilot vessel	72	Hazardous cargo Y
24	Hazardous WIG OS	51	Search And rescue Vessel	73	Hazardous cargo Z
30	Fishing Vessel	52	Tugs	74	Hazardous cargo OS
31	Towing Vessel	53	Port tenders	80	Tanker
32	Towing Vessel L > 200m B > 25m	54	With anti-pollution equip	81	Hazardous Tanker X
33	Dredge or underwater operation	55	Law enforcement vessel	82	Hazardous Tanker Y
34	Vessel-Driving operation	58	Medical Transport	83	Hazardous Tanker Z
35	Vessel-military operation	59	Ships and aircraft of states not parties to an armed conflict	84	Hazardous Tanker OS
36	Sailing vessel	60	Passenger ships	90	Other types of ship
37	Pleasure craft	61	Hazardous Passenger ships X		
40	HSC	62	Hazardous Passenger ships Y		

Table 3 - Ship type description.

Radar

On the home page, click **AIS Radar** to enter the AIS radar page as shown in Figure 34. The AIS radar page displays four distance marking circles fixedly, and the field of view can be adjusted by zooming in or out.
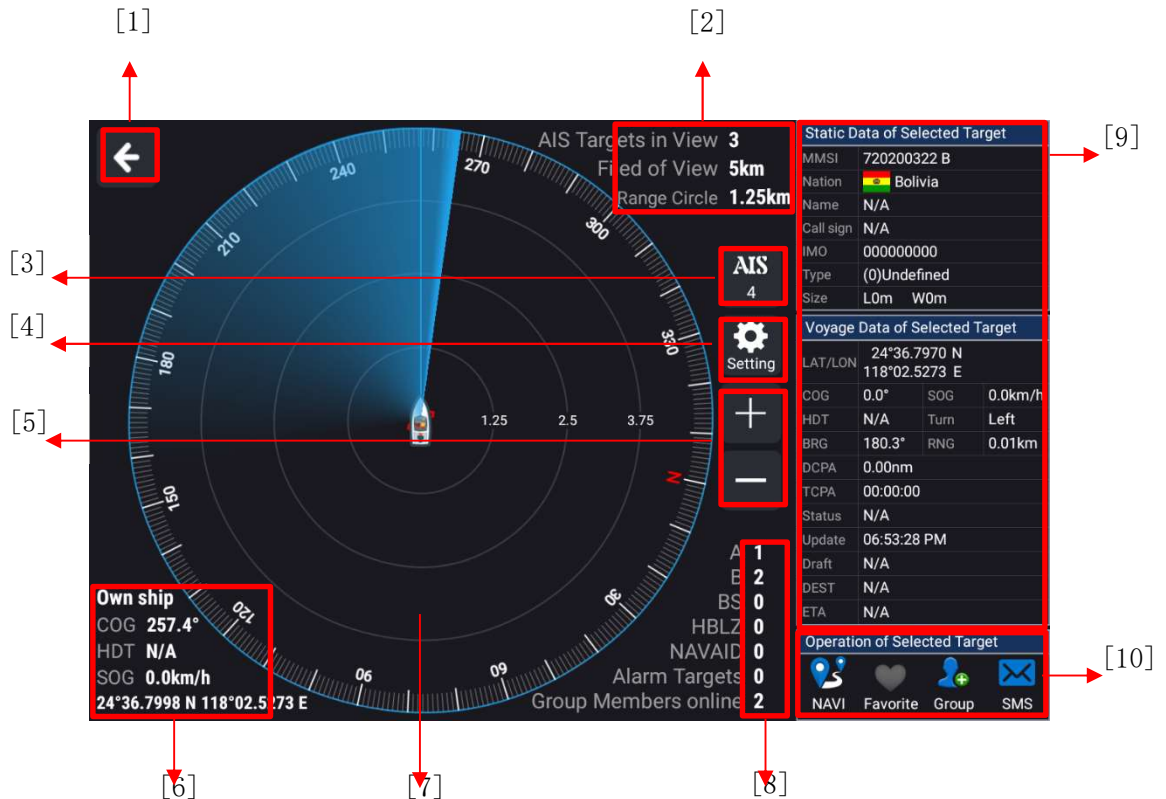
Figure 34 - AIS Radar.

1. **Back to home button**: Click to return back to the home page.
2. **Field of view data information window**: Displays the range circle, the size of the field of view and the total number of AIS targets in the field of view.
3. **Number of AIS targets**: Click this button to quickly jump to the AIS list, the display number is the total number of AIS targets received by the device.
4. **Setting**: Click this button to independently control the display of the heading line, course line and AIS target track length on the AIS radar page. For the specific parameter values, please refer to the **AIS target display** section.
5. **Zoom in / out button of range circle**: Click the [+] and [-] buttons to zoom in and zoom out to adjust the field of view, providing eight levels of 2nm, 5nm, 10nm, 15nm, 20nm, 30nm, 40nm and 50nm.
6. **Ownship data display window**: Display the own ship's latitude and longitude, COG, HDT, SOG and other data.
7. **AIS target display window**: Displays AIS targets within the field of view, specific details are as follows:

a. This window displays the CPA line with the most dangerous ship that may be encountered. If the cursor selects the AIS target that may be encountered, the corresponding CPA line will be drawn simultaneously for reference.

b. This window will flash the AIS target that is currently alarming.

c. In the area alarm switch is turned on, the area alarm circle will be drawn in synchronization with the ownship's position in this window.

8. **AIS target number information display window**: Contains A-type targets, B-type targets, base stations, mobile base stations, navigation aids, current alarm targets, and the number of online members of the group.

9. **AIS target data information bar**: Displays detailed information such as static data and navigation data of the selected AIS target. If there is no selected AIS target, the display is empty.

10. **Selected AIS target operation bar**: Contains the related operations of navigation, favorite, joining a group, and short messages. For details of the operation, see the **ship parameter setting** section. If no AIS target is selected, the corresponding AIS operation menu button will be grayed out.

Group Management

Click **Group Management** to enter the list of group management, as shown in Figure 35. Group management can monitor the dynamics of ships, and the group management list can hold up to 1,000 ships.

Figure 35 - Group Management.

1. **Search:** Search using the MMSI or ship name and other keywords to search for ships in the group.
2. **Add**: Click **Add**, select **AIS List** or **Manual Input**. To add from the **AIS List**, Open the AIS list, select the corresponding vessel to add to the fleet. For **manual input**: pop up the add window, enter the MMSI of the corresponding vessel, click **Confirm** to complete the addition.
3. **Edit**: Click **Edit** to edit the group information, including the group name, display style, move alarm (shift alarm circle), leave alarm (leave alarm circle), signal loss alarm, CPA alarm, area alarm, ship type alarm, please refer to the **AIS alarm** section for more details on alarm setting.
4. **SMS:** Click **SMS**, select **Addressing** to send AIS short message to the corresponding vessel, and select **Broadcast** to broadcast and send AIS short message.
5. **Add group**: Click **Add group** to create a new group, and the name, display style, move alarm (shift alarm circle), leave alarm (leave alarm circle), signal loss alarm, CPA alarm, area alarms, and ship type alarm, as shown in the figure 36. A description of the **Add group** fields is as follows:
   a. **AIS group**: Enter group name.
   b. **Display style**: Sets the display style of the ship. After the setting is completed, all the ships in a group are displayed in the selected style on the chart page.
   c. **Move alarm**: Slide the move alarm to enable it, specifically taking the current position of each ship as the center, and draws a circle to indicate the range of the ship's alarm circle. As long as any ship in the group exceeds its own alarm circle, it will trigger a move alarm. Click the move alarm switch to reset the alarm circle.
   d. **Leave alarm**: Turn on the leave alarm switch to set the leave alarm circle. This function draws an alarm circle around the ship. When the position of any ship in the group exceeds the alarm range circle, the leave alarm will be triggered.
   e. **Signal loss**: Turn on the signal loss alarm switch, any ship in the group does not receive the AIS signal and disappears from the chart, triggering the signal loss alarm.
   f. **CPA alarm**: See the CPA alarm setting in the **AIS Alarm**, TCPA and DCPA settings.

Figure 36 - Add Group.

Ship Parameters

On the home page, click **Ship Parameters** to view the ownship parameters page, including the Differential setting, NAVI parameters and static parameters.

NAVI Data

Navi data list

There are two ways to view the navigation list, the specific details are as follows.

Method 1: On the home page, click **NAVI Data** to enter the navigation data list.

Method 2: On the chart page, swipe the screen to the left or press the physical **MENU**, a pop-up menu will appear, select **NAVI Data** to enter the navigation data list. The Figure 37 shows the Navi data list.

Figure 37 - Navi data list.

History Navi

The History navigation data includes three types: waypoint, route and MOB. The **History Navi** list is shown in Figure 38.

Figure 38 - History Navigation.

The operation of the following icons is as follows.

1. **NAVI**: After selecting the waypoint, route or MOB to be navigated to, click **NAVI** to start navigating with the selected waypoint, route or MOB.
2. **View**: Click **View** and the selected waypoint, route or MOB will be displayed at the center of the screen.

Waypoint and Route operation

1. *Add Navigation Data*

   Method 1: On the chart page, long press the position of the starting point of the new waypoint/route to be created. In the pop-up operation box, click the **Add** button to enter the add data state. For more details, please refer to the **Add Waypoint** section and **Add Route** section.

   Method 2: On the home page, click **NAVI Data** to enter the navigation data list, and click **Add** to select a waypoint or route. In the **Add** page, detailed operations are as follows.

2. *Delete navigation data*

   Click on the chart page to select the navigation data to be deleted, and click **Delete** in the pop-up operation box to delete the data.

3. *Batch edit navigation data*

   On the home page, click the **NAVI Data** button to enter the navigation data list, long press the navigation data list to enter the batch operation page, you can choose to batch lock/unlock, display/hide multiple or all navigation data, and perform Deletion.

Plot Data

Plot data list

There are two ways to view the plot data list shown in Figure 39.

Method 1: On the main page, click **Plot Data** to show the plot data list.

Method 2: On the chart page, slide the screen to the left or press the physical button **MENU**, a pop-up window will appear, click **Plot data** to show the Plot data list.
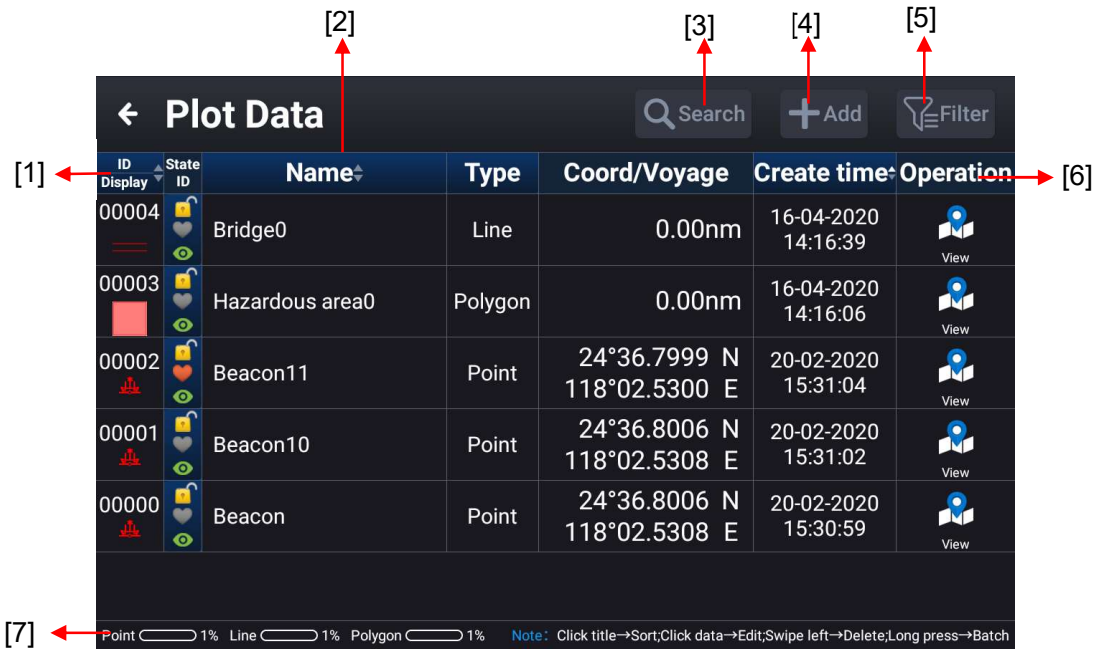
Figure 39 - Plot data.

A description of the different functions shown in Figure 39 is described below, where the numbers correspond to:

[1] **ID display**: Number and style, click to sort ID in ascending or descending order.

[2] Data can be sorted based on Name, and time-creation of the data.

  (a) Click **Name** to sort by the first letter of the name.

  (b) Click **Create time** to sort by creation time.

[3] **Search**: Enter the number or name keyword to search the plot point/line/polygon.

[4] **Add**: Add plotting data, see **Plotting Data Operation** section.

[5] **Filter**: Filters the data in the list by lock/unlock, favorite/un-favourite, point/line/polygon.

[6] **View**: Select the point/line/polygon to be viewed, click **View** to show to the chart page, the current point/line/polygon is displayed in the center of the display screen.

[7] **Data capacity**: display points/line/polygon storage percentage.

Plot data operation

    1.   Add a new data point

There are two methods to add a new data point to the plot as described below

        Method 1: On the chart page, press and hold the position where you want to add a new plot point, plot line start point, or plot polygon start point, and click the **Add** button in the pop-up operation box to enter the new data state. For specific operation details, please refer to sections **Add Plot Point**, **Add Plot Line** and **Add Plot polygon**.

        Method 2: On the main page, click **Plot Data** to view the plot data list, or on the chart page, swipe from right to left, and a menu item window will pop up, click **Plot Data** to access the Plot data list, click **Add** to create a plot point/plot line/plot polygon.

    2.   Delete data point

On the chart page, click to select the data point to be deleted, and click **Delete** in the pop-up operation box to delete the data.

    3.   Batch editing plot data

Long press the plot data list to enter the batch operation page to choose to batch lock (unlock), favorite (un-favorite), display (hide) multiple or all plot data, delete and other operations.

Add plot point

        Method 1: On the chart page, select the position to add the plotting point, long press the position to open the information window as shown in figure 40, and click **Add** in the window to open the information editing window as shown in figure 41.
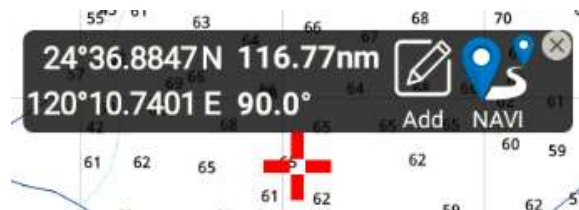
Figure 40 - Add plot point window: Click to Add a point.
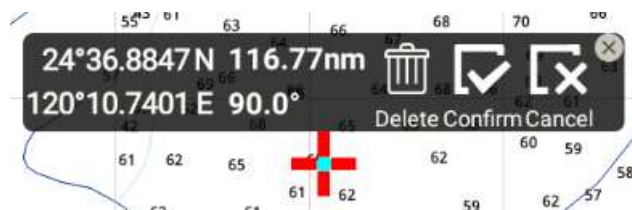
Figure 41 - Add plot point: Click to confirm.

Add plot line

On the chart page, long press to add the position of the first point, a window pops up, click **Add** to determine the position of the first point, and click the second position on the chart to determine the second point as shown in Figure 42. Multiple points can be added by clicking the chart multiple times. After the drawing line is selected, click **Confirm** to enter the plot line editing window, and select **Line** as the data to perform related editing of the line as shown in Figure 43.
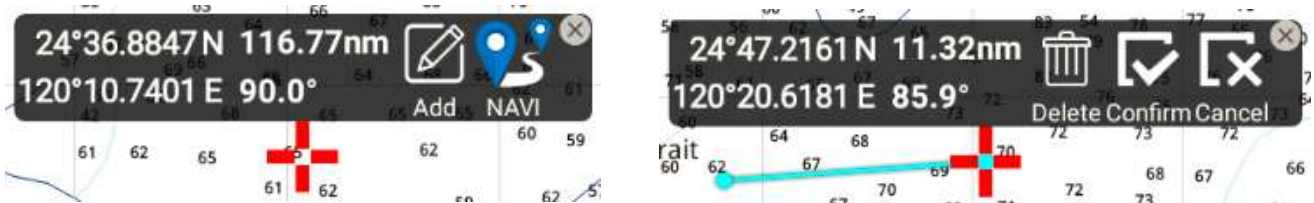
Figure 42 - Add plot line.
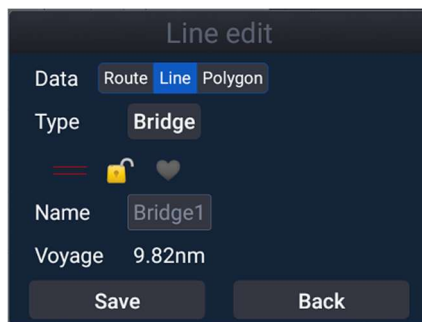
Figure 43 - Line edit.

Add plot polygon

Method 1: Long press on the chart page to add the first desired point. When pressed, an information window pops up, click **Add** to determine the position of the first point. Long press to select the position of the second desired point. Multiple points can be added to the graph. After selecting the plotting points, click **Confirm** to enter the plotting polygon editing window, and select **Polygon** to edit the plotting polygon, as shown in Figure 44.
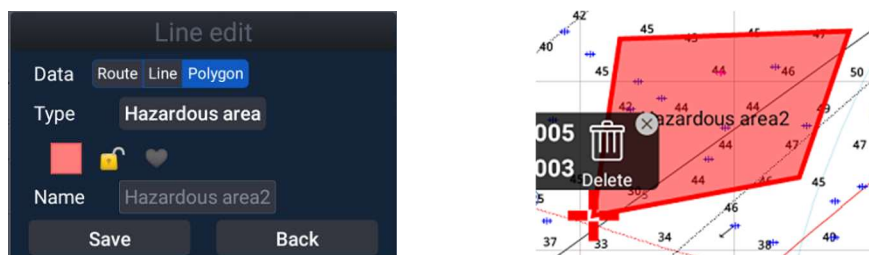
Figure 44 - Polygon edit.

A description of the options shown in Figure 44 is as follows:

[1] **Data**. Select polygon.

[2] **Type**. Select between various options such as: Hazardous area, Marine operation area, Fishing area, Forbidden fishing area, Anchorage, Anchorage-prohibited area, Restricted area, Caution area or Others.

[3] **Display style**. Set the style, width and color (available in 8 line styles, 3 line widths and 6 colors).

[4] **Lock icon** can be set to lock or unlock.

[5] **Heart-shaped icon**. Set to favorite or remove from favorite list.

[6] **Name box**. Enter the name of the plot polygon.

[7] After editing, select **Save** to save the edited plot polygon directly to the plot data list, select **Back** to return to the chart page.

Track

To view the track management page, go to the homepage and click on **Track,** and the Track list windows opens as shown in Figure 45.
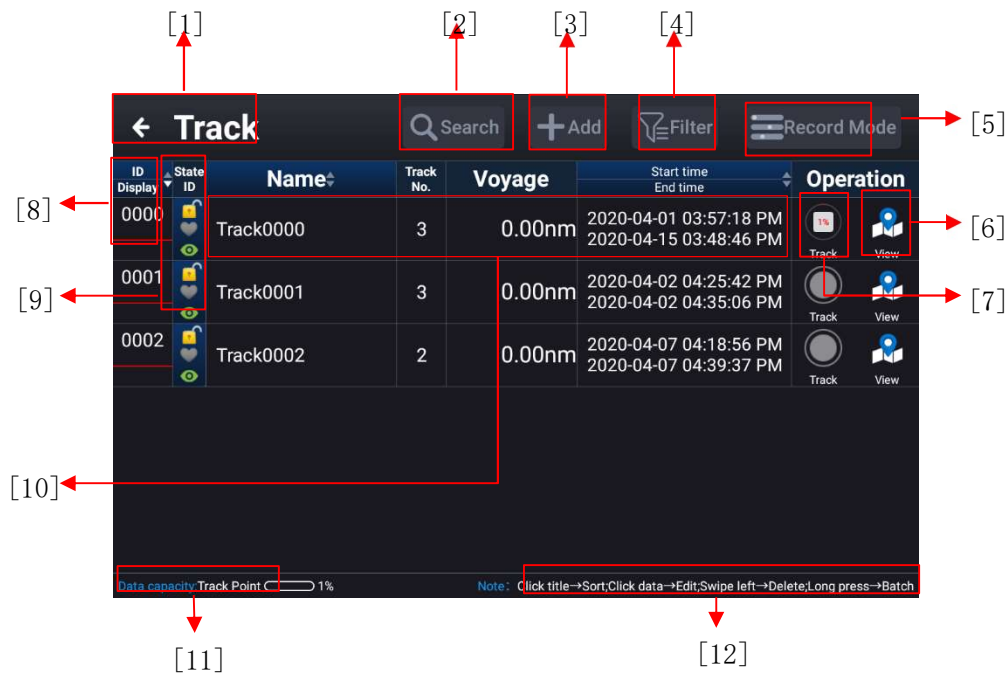
Figure 45 - Track list.

Dashboard

On the home page, click **Dashboard** to view the dashboard page as shown in Figure 46.

Figure 46 - Dashboard.

[1] Click on any of the circular displays to switch the display content to COG, HDT, SOG or BRG, as shown in figure 47.

Figure 47 - Dashboard setting to switch displays.

[2] Click any data frame to switch the display content to the Ownship Lat/Lon, date, DPT, Wind, TEMP, XTE, RNG, BRG, ETA as shown in Figure 48.

Figure 48 - Dashboard display settings.

Sailing Data

On the home page, click **Sailing Data** to enter the navigation data management page, as shown in Figure 49. Click on any data frame to switch the display contents to: Ownship Lat/Lon, SOG,COG,HDOP,VDOP,Date,HDT,DPT,Wind, TEMP, XTE, RNG, BRG, ETA or to reset the data frame to their default display settings.

Figure 49 - Sailing data.

MOB

The water drop mark is used to urgently press the button when someone on the ship falls into the water to mark the position of the person who has fallen into the water, which is convenient for the ship to turn back to find the person who has fallen into the water. The position of the MOB is only a reference position for a person to fall into the water, which is used by the driver and will not be sent out by mistake. The specific details of the way to enter the MOB list are as follows.

Figure 50 - MOB.

[1] On the home page, click **MOB** to enter the MOB list.

[2] On the chart page, slide from the rightmost edge of the screen to the left or press the physical button **MENU**, and click **MOB** in the pop-up function item window to enter the MOB list.

[3] Slide left to delete the data bar to bring up the delete button, click **Delete** to delete the data, long press a certain MOB mark to enter the batch operation page. Multiple (all) data can be deleted in batches.

[4] Press the physical button MOB to quickly create a MOB point at the current ship position and save it to the MOB list.

Display mode

On the main page, click **Display Mode** to view the mode adjustment window, where one can adjust the display brightness and volume, set the chart mode and set the automatic switching mode; turn on the **Automatic Switching of Chart Modes** switch. The chart automatically switches to daylight mode after 06:00 and to night mode after 18:00.

Figure 51 - Display mode page.

SMS

Click **SMS** to view the short message page, as shown in Figure 52.
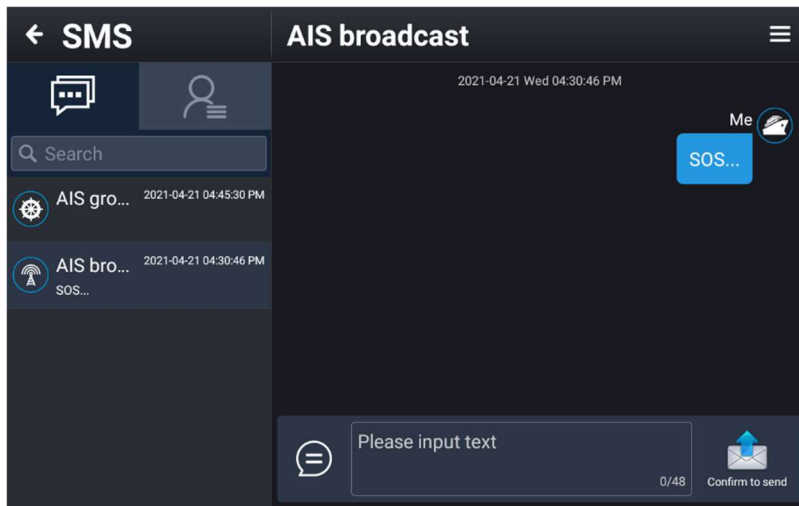
Figure 52 - SMS page.

SOS

Click **SOS** or long press the physical key of **MOB SOS** to view the security information page, as shown in the Figure 53. Clicking on the content of the message to be sent will pop up a reminder window, click **Confirm**, and the message will be sent in the form of broadcast, click **Cancel** to cancel sending the message.
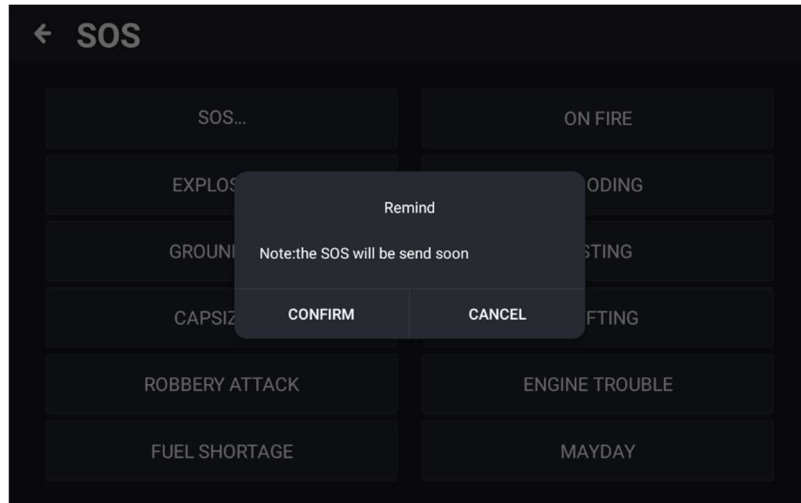
Figure 53 - SOS message.

Alarm

On the home page, click **Alarm** to view the alarm setting/log window, as shown in Figure 54.
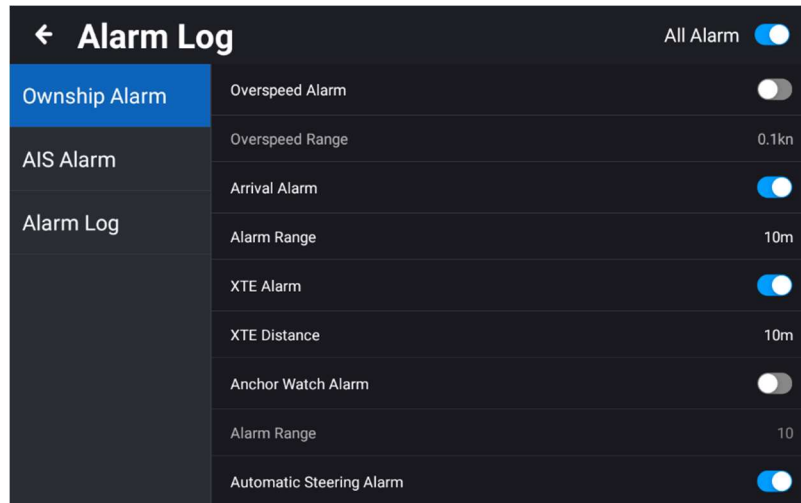
Figure 54 - Alarm log.

Ownship Alarm

On the alarm page, click **Ownship Alarm** to set the different alarm settings related to ownship. Slide the page to view all the alarm settings as described below

[1] **Overspeed Alarm**: Set to ON to set the overspeed alarm. The alarm is triggered when the speed of ownship exceeds the value set.

[2] **Arrival Alarm:** Set to ON to set the desired radius between ownship and destination. When the distance between own ship and the destination is equal to the radius of the alarm, the alarm is triggered.

[3] **XTE Alarm**: Set to ON to set the distance value of the yaw alarm. The alarm is triggered when the ship exceeds the maximum yaw value (Distance left/right of the of course).

[4] **Anchor Watch Alarm**: Set to ON to set the radius of the off-anchor alarm. When the ship moves out of the circle range set with the off-anchor alarm, the alarm is triggered.

When the anchor watch alarm is turned on, draw a circle with the current position of own ship as the center point, and the radius as the setting value of the alarm radius. When the own ship moves out of this circle, the alarm is triggered.

[5] **Automatic Steering Alarm**: When the ship has multiple waypoints (inflection points) in the course of its route, the alarm will turn on every time it reaches an inflection point.

[6] **Plot Point Alarm**: When set to ON, the alarm radius is set with the plot point as the center. An alarm is trigger when the Own ship is within the alarm range of the plot point. The alarm type can be set, beacon, hazard marker or others.

[7] **Plot Line Alarm**: When set to ON, the alarm radius is set with the plot line as the center. The alarm is triggered when the Own ship is within the alarm range of the plot line. The alarm type can be set, bridge, cables and pipes, boundary line or other.

[8] **Plot Polygon Alarm**: Sets an alarm radius from the edge of the plot polygon. The alarm is triggered when the Own ship is within the alarm orientation of the plot polygon. The alarm type can be set, hazardous area, marine operation area, fishing area, forbidden fishing area, anchorage, anchorage-prohibited area, restricted area, caution area or others.

AIS Alarm

On the alarm setting page, click **AIS alarm** to set the alarm items related to the AIS target. Slide the page to view all the alarm setting items as described below:

[1] **CPA Alarm**: When set to ON, the alarm will be triggered when the set meeting time and meeting distance are met, the ship and other AIS ships will encounter an alarm.

[2] **TCPA:** Set the trigger time of the meeting alarm between own ship and other AIS ships (0-60min).

[3] **DCPA:** Set the triggering distance (0.1-20nm) of the alarm between the ship and other AIS ships.

[4] **Area alarm**: Draw a range circle centered on the ship, and the AIS vessel will trigger the alarm when it enters the alarm circle.

[5] **Regional alarm:** Setting range: 0.1-99nm.

[6] **Ship type alarm**: The device receives the set alarm ship type signal (See Table 3 Ship type description), that triggers the alarm.

Alarm Log

On the alarm setting page, click **Alarm Log** to view the historical alarm records, the specific content includes, ID, alarm type, alarm content, and alarm time.

GNSS

 On the home page, click **GNSS** to view the GNSS Satellite information. The GNSS source include GNSS & AIS / NMEA0183_2 / NMEA0183_4.

> [1] **HDOP**: Estimates horizontal position accuracy calculated based on the satellite geometry at the time of positioning, the range is 0.5 ~ 99.9, the smaller the value, the better the position accuracy.
>
> [2] **VDOP**: Estimates vertical position accuracy calculated based on the satellite distribution during positioning, range 0.5 ~ 99.9.
>
> [3] **Altitude**: The altitude of the current location.
>
> [4] **In View**: Number of satellites in the field of view.
>
> [5] **In Use**: Number of satellites actually in use to calculate position.

Figure 55 – GNSS window.

Tide

On the home page, click **Tide** to view the tide window as shown in Figure 56.
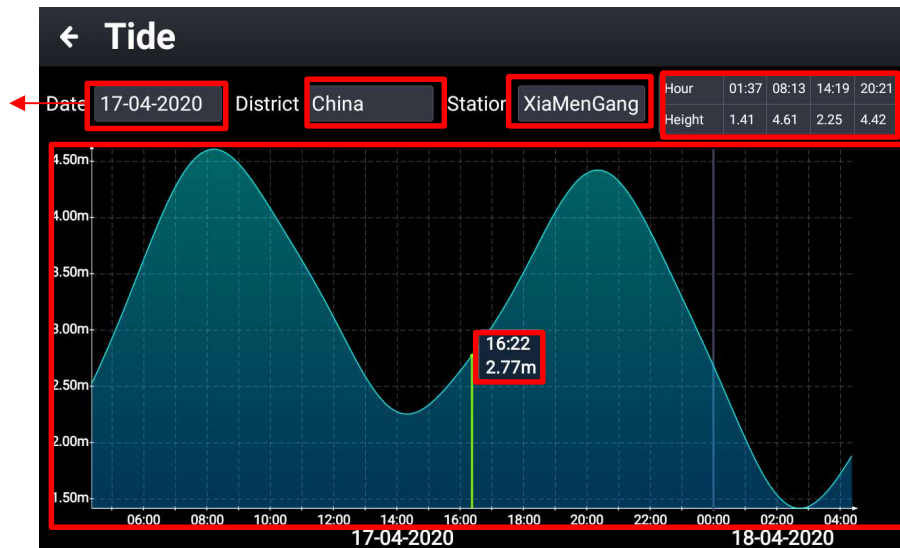
Figure 56 - Tide window.

On the chart, click the tidal station icon, the relevant information of the tidal station will also pop up, you can directly click to view the detailed tidal information of the current tidal station, as shown in Figure 57.

Figure 57 - Tidal Information.

Calendar

On the home page, slide the screen to the left to switch pages, and click **Calendar** to view the calendar.

Switching Record

On the home page, click **Switching Record** to view the device boot time, last working time, off time, and working hours, as shown in the following figure 58.

ID	Boot Time	Last Working Time	Off Time	Working Hours
01	15-04-2020 14:39:45	17-04-2020 17:43:37		002D03H03M55S
02	15-04-2020 13:46:39	15-04-2020 13:54:09	15-04-2020 13:54:22	000D00H07M43S
03	14-04-2020 11:00:20	14-04-2020 17:36:37	14-04-2020 17:36:38	000D06H36M18S
04	07-04-2020 13:56:04	07-04-2020 14:09:11	07-04-2020 14:09:56	000D00H13M52S
05	07-04-2020 13:24:05	07-04-2020 13:48:53	07-04-2020 13:49:01	000D00H24M56S
06	02-04-2020 14:22:58	02-04-2020 14:46:47	02-04-2020 14:46:56	000D00H23M58S
07	02-04-2020 13:45:15	02-04-2020 14:15:27	02-04-2020 14:15:29	000D00H30M14S
08	01-04-2020 14:02:32	01-04-2020 14:07:55	01-04-2020 14:08:11	000D00H05M39S

Figure 58 - Switching record window.

Video Surveillance

The device supports up to four network cameras, which can be used for video monitoring, video recording, screen capture, mobile monitoring alarm and other functions.

Installation connection diagram

The wiring diagram of the four network cameras are shown in Figure 59.

Figure 59 – Wiring connection diagram.

Video input screen

On the homepage click the **Video Surveillance** button to view the video monitoring screen where the user can take a screenshot, video recording, channel switching, alarm area setting, monitor transmission on or off, full screen display and other operations. The screenshots and recording are saved to the microSD card.
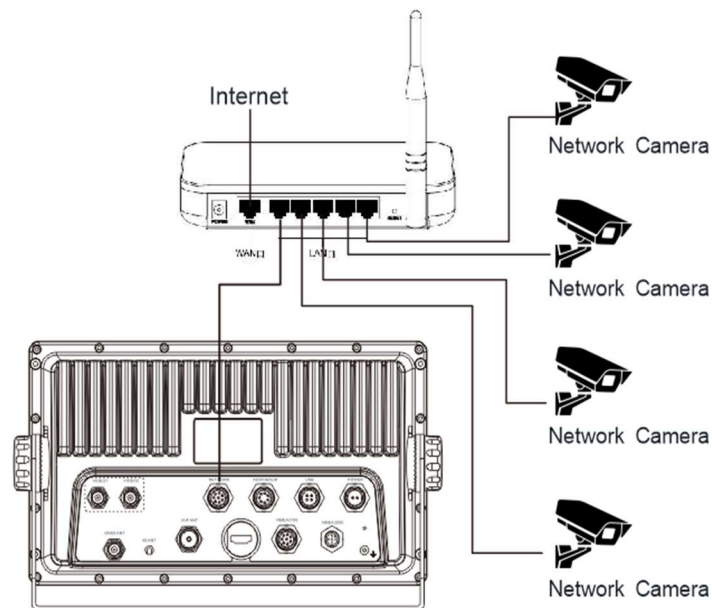
Video Surveillance Operation Menu

Under the video surveillance page, swipe to the left of the screen or press the **MENU** button to bring up the video surveillance operation menu, which includes camera management, video management, screenshot management, alarm information management, and video monitoring settings as shown in Figure 60.
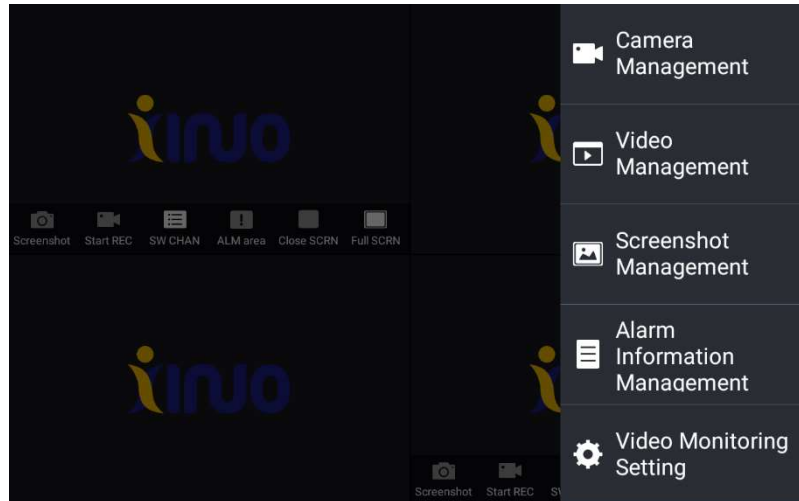
Figure 60 - Video surveillance operation menu.

Camera Management

Displays and sets the receiving switch of camera screen and the connection status of all cameras.

Supports adding comments/remark that will be displayed on the video surveillance screen.

Video Management

Manages the video stored in the device, and play, pause, drag progress, search and deletion of the video file.

Screenshot Management

Manages pictures stored in device screenshots, and share, search, and deletion of pictures.

Alarm Information Management

Manages the historical alarm records of the camera, including alarm time, alarm camera name, alarm type, etc. At the same time, you can select the alarm information to delete.

Video monitoring Setting

[1] **Automatic Video**

> The recording mode can be set to provide motion detection technology and full time recording for mode selection. When motion detection technology is selected, the system will automatically start recording if the monitoring screen meets the conditions of motion monitoring.

> Mode selection: You can select either motion detection or full-time recording. When selecting motion detection, you can set the sensitivity to low / medium / high, and report alarm information and turn on the video switch. Select full-time recording, then full-time recording.

[2] **Timed Video**

> Sets the start time and end time of the video recording.

[3] **SD card Memory Management**

The memory card can be formatted and the storage location can be selected. At the same time, for the data storage of the memory card, there are two options are provided, automatic coverage when the data is full and a reminder when the storage capacity is less than 20%.

[4] **Alarm Setting**

There are three alarm types, namely, signal disconnection, occlusion screen and video disconnection, which can be set by the user according to the actual use.

Fishing Logs

On the home page, click **Fishing Logs** to view the fishing log menu, and record the operating time, location, catch and other information of the fishing boat.

[1] **Start job**

Click on **Start** to record the start job time and latitude and longitude position information.

[2] **End job**

Click on **End** to record the time, latitude and longitude position information of the end job. After finishing the operation, click the fishing record to enter the relevant data of the catch, click **Confirm** to save, and the fishing log addition/update is completed.

Figure 61 - Fishing log.

[3] **Fish Species**

Click on **Fish Species** to configure the fish type in the fishing log list. Select the fish type and add it to the selected list. If there is no corresponding fish type in the fish type dictionary, you can select **Define** on the fish type configuration page and add the fish species as shown in Figure 62.
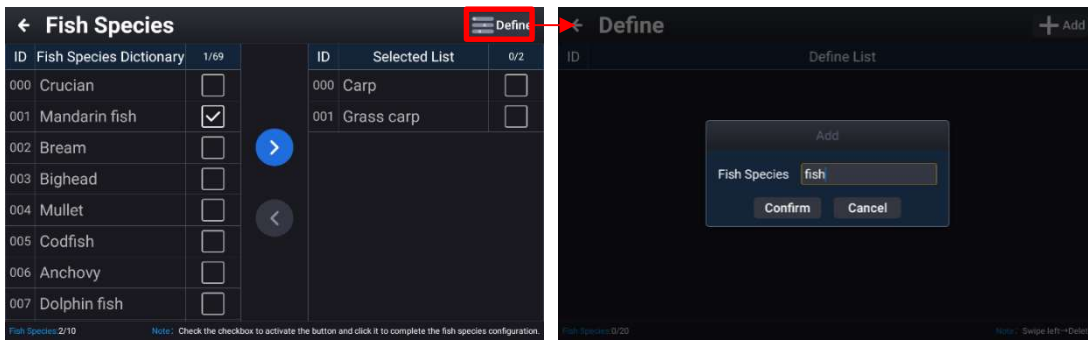
Figure 62 - Fish species input.

[4] **Fishing log export**

Log in to www.ships66.com, bind the device ID of the device, click on **My Equipment → Fishing Log** to view the data information of the fishing log as shown in Figure 63, and click **Export** to export the fishing log data list.
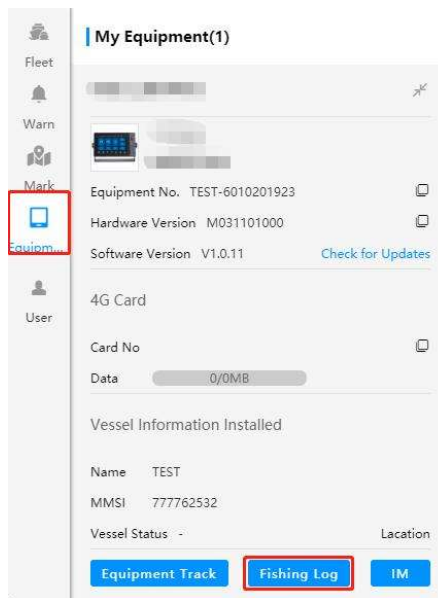
Figure 63 - Fishing log.

G2B GNSS Compass Access

The Figure 64 illustrates the wiring connection between the G2B and the M10. A description of the wires are described below:

Figure 64 - Wiring connection between G2B and M10.

[1] **NMEA0183_1**：The M10 brown line connects to the yellow line of the G2B. The orange line of the M10 connects to the yellow/white striped line of the G2B. The M10 and G2B must be set to the same baud rate.

[2] **NMEA0183_2**：The M10 yellow line connects to the green line of G2B. The green line of M10 connects to the white/green striped lines of the G2B. The M10 and G2B must be set to the same baud rate. The settings and display pages are shown in Figure 65.
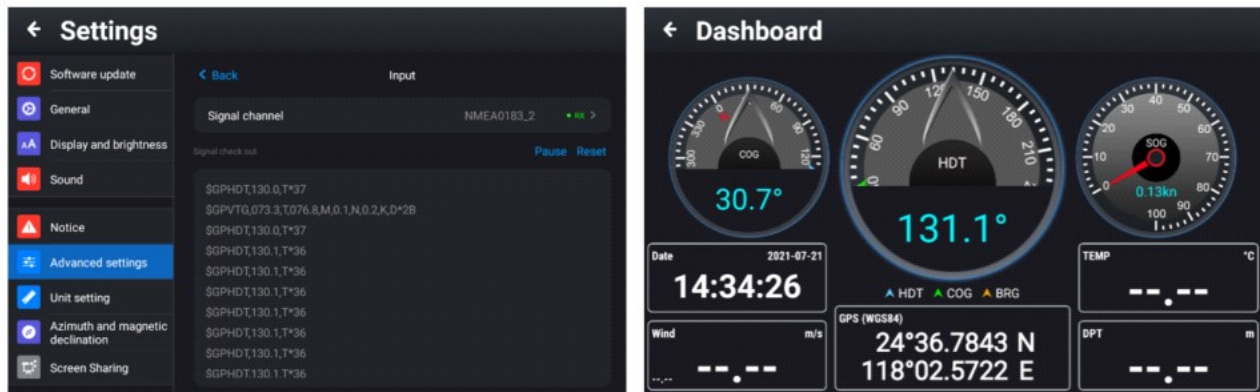
Figure 65 - Advanced settings and Dashboard.

[3] **NMEA0183_4**：The black line of the M10 connects to the purple line of the G2B, and the red line of M10 connects to the white/violet striped line of the G2B. The M10 and G2B must be set to be the same baud rate that the G2B outputs the RMC sentence to the M10. The advanced settings page showing the $GPRMC sentence, and the output display page are shown in Figure 66.
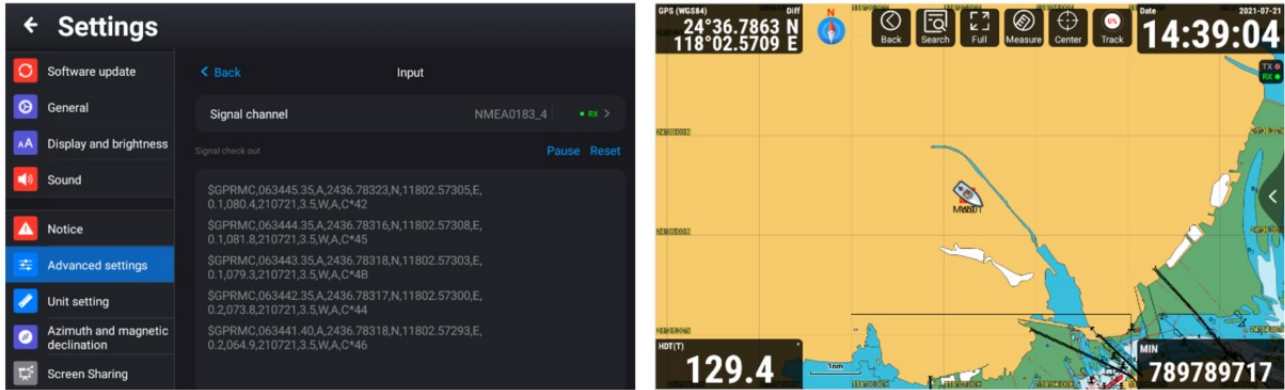
Figure 66 - Baud rate setup for G2B and M10.

Appendices

Appendix 1

Mechanical Specifications

The Figure 67 shows the mechanical specification diagram.
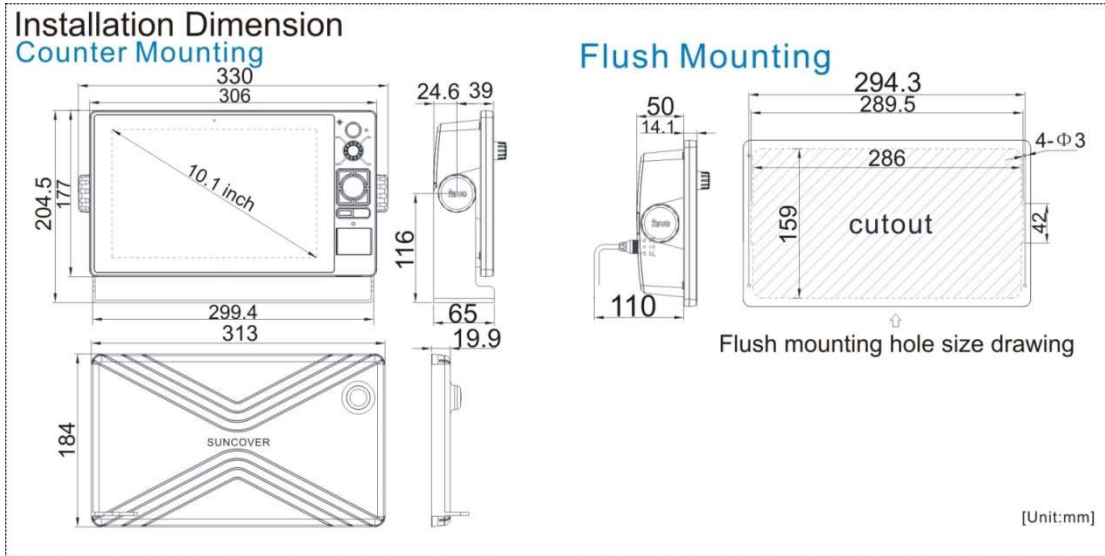
Figure 67 - Mechanical Specification diagram.

Appendix 2

Technical Specification

Equipment Parameters	
Operation System	Android 5.1 with OpenGL ES 3.0 & OpenGL 1.1
CPU	Cortex-A17 Quad core
CPU Speed	1.8GHz 32 Bit
RAM	2GB DDR3 1333MHz OR 4GB DDR3 1333MHz
Flash Memory	16GB Flash Memory OR 32GB Flash Memory
Video Engine	Mali-T764
Keyboard	1 Knob Encoder and 9 Function Keys
Touch Panel	Capacitive Multi-touch Screen
Size	10.1 Inch
Brightness	600 cd/m² (Max)
Viewing Angle	Wide View 85°
Resolution	1280 x 800
Power Voltage	DC 10V-36V
Power Consumption	15W
GNSS	GPS / BDS/ GPS+BDS
	Position Accuracy < 10m,95% typical
	Cold Start Time ≤ 32s Warm Start Time ≤ 1s
Audio	3W
Micro SD Card Slot	Support Two 512G High Speed Micro-SD Card
Bluetooth	BT4.0
Wi-Fi	802.11 b/g/n
4G Module	LTE/WCDMA/GSM Internal/External Antenna Switch
Input	2 NMEA0183 Input,1 NMEA0183 can be set as Input or Output. All are with Independent Baud rate

Equipment Parameters	
Operation System	Android 5.1 with OpenGL ES 3.0 & OpenGL 1.1
CPU	Cortex-A17 Quad core
CPU Speed	1.8GHz 32 Bit
RAM	2GB DDR3 1333MHz OR 4GB DDR3 1333MHz
Flash Memory	16GB Flash Memory OR 32GB Flash Memory
Video Engine	Mali-T764
Keyboard	1 Knob Encoder and 9 Function Keys
Touch Panel	Capacitive Multi-touch Screen
Size	10.1 Inch
Brightness	600 cd/m² (Max)
Viewing Angle	Wide View 85°
Resolution	1280 x 800
Power Voltage	DC 10V-36V
Power Consumption	15W
GNSS	GPS / BDS/ GPS+BDS
	Position Accuracy < 10m,95% typical
	Cold Start Time ≤ 32s Warm Start Time ≤ 1s
Audio	3W
Micro SD Card Slot	Support Two 512G High Speed Micro-SD Card
Bluetooth	BT4.0
Wi-Fi	802.11 b/g/n
4G Module	LTE/WCDMA/GSM Internal/External Antenna Switch
Input	2 NMEA0183 Input,1 NMEA0183 can be set as Input or Output. All are with Independent Baud rate
Output	1 NMEA 0183 Output, 1 NMEA0183 can be set as Input or Output. 1 Audio Output, 1 Alarm Output
LAN Net Work	1000Mpbs
Operating Temperature	-15℃～+55℃
Standard	IEC-60945,IEC-62287-1 2010, IEC-61108-1
AIS Class B	
Frequency	156.025 ~ 162.025MHz
Bandwidth	25KHz
Modulation	GMSK/FM
Data Rate	9600bps

Equipment Parameters	
Number of AIS Transmitter	1
Number of AIS Receiver	2 channels:
	Channel A CH87B(161.975MHz)
	Channel B CH88B(162.025MHz)
Transmitting Power	2W
Rx Sensitivity	< -107 dBm @ 20% PER

Warranty Information

Limited Warranty

This Limited Warranty (the "Warranty") covers all V Series Camera products & accessories (the "Equipment") sold by ComNav Marine Ltd. ("ComNav").

LIMITED Three YEAR WARRANTY

ComNav warrants to the Purchaser, provided that the recommended installation and maintenance procedures set forth in the manual (the "Manual") provided with the Equipment have been followed, and subject always to the other provisions of this Warranty, that the Equipment is free from defects in workmanship and materials under normal use and service for a period of three (3) years from the date of purchase of the Equipment by the Purchaser.

EXCLUSIONS

This Limited Warranty is null and void if:

1. The serial number of the Equipment has been removed, altered or mutilated;

2. Any of the anti-tamper seals covering case-screw holes, or other mechanisms for opening the Equipment's case, have been removed, broken or otherwise tampered with;

3. There are any defects in it, or damages to it, caused by:

    a.   Faulty installation or hook-up of the Equipment;

    b.   Abuse, misuse, or any use of the Equipment in violation of the instructions set forth in the Manual;

    c.   Shipping, alterations, or incorrect and/or unauthorized service;

    d.   Accident, exposure of the Equipment to excessive heat, fire, lightning or other electrical discharge, or water immersion;

    e.   Water damage due to failure to fully fasten the plug connected into the equipment's power/signal receptacle;

    f.   Improper or inadequate ancillary or connected equipment.

OTHER LIMITATIONS AND EXCLUSIONS

1. The Equipment is not intended for primary navigation or for use in safety of life applications; ComNav does not warrant or guarantee that the Equipment will perform in accordance with the requirements of such usage;

2. ComNav reserves the right to modify the Equipment without any obligation to notify, supply or install any improvements or alterations to existing Equipment.

NO OTHER WARRANTIES

THE FOREGOING WARRANTY IS EXCLUSIVE OF ALL OTHER WARRANTIES AND CONDITIONS, WHETHER WRITTEN, ORAL OR IMPLIED, ARISING BY STATUTE OR OTHERWISE, WITH RESPECT TO THE DESIGN, SALE, INSTALLATION OR USE OF THE

EQUIPMENT, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR THE ORDINARY PURPOSES FOR WHICH THE EQUIPMENT IS USED OR FITNESS FOR A PARTICULAR PURPOSE, AND ANY OTHER OBLIGATIONS ON THE PART OF COMNAV, ITS EMPLOYEES, SUPPLIERS, AGENTS, OR REPRESENTATIVES.

LIMITATION OF LIABILITY

The extent of ComNav's liability for damages of any nature to the end purchaser or any other person or entity whether in contract or tort, and whether to persons or property, shall in no case exceed, in the aggregate, the cost of correcting the defect in the equipment or, at ComNav's option, the cost of replacing the defective item. In no event will ComNav be liable for any loss of production, loss of profits, loss of use or for any special, indirect, incidental, consequential or contingent damages, even if ComNav has been advised of the possibility of such damages. Without limiting the foregoing, ComNav shall not be liable for any damages of any kind resulting from installation, use, quality, performance or accuracy of the equipment.

NOTICE OF DEFECT

The Limited Warranty will not apply with respect to any defective Equipment unless written notice of such defect is given to ComNav, by mail to the address for ComNav set forth below, or by facsimile to ComNav at 604-207-8008, and unless that written notice is received by ComNav within ten (10) days of the date upon which the defect first became known to the Purchaser.

Notices sent by mail from within North America will be deemed to be received by ComNav on the seventh (7th) day first following the date of posting. Notices sent by mail from anywhere else in the world will be deemed to be received by ComNav on the tenth (10th) day next following the date of posting. Notices sent by facsimile will be deemed to be received by ComNav on the date of transmission with appropriate answerback confirmation.

REMEDIES NOT TRANSFERABLE

The Purchaser's remedies under this Warranty apply only to the original end-user of the ComNav Equipment, being the Purchaser, and apply only to the original installation of the Equipment. The Purchaser's remedies under this Warranty are not transferable or assignable by the Purchaser to others in whole or in part.

CUSTOMER REMEDIES

1. If the Equipment or any part thereof, proves to be defective within the warranty period, the Purchaser shall do the following:

   a. contact ComNav, by phoning 604-207-1600, to discuss the nature of the problem and to obtain return shipping instructions for the defective Equipment;and,

   b. prepare a detailed written statement of the nature and circumstances of the defect, to the best of the Purchaser's knowledge, and including the date of purchase of the Equipment, the place of purchase, the name and address of the installer, and the Purchaser's name, address and telephone number, all to be sent, along with proof of purchase, to ComNav at the address set out below, and within the time limits set out above for Notice of Defect.

2. If, upon examination by ComNav, the defect is determined to result from defective workmanship or material and if the defect has occurred within the warranty period set forth above, the Equipment or the defective parts thereof shall be repaired or replaced, at ComNav's sole option, without charge,

and shall be returned to the Purchaser at ComNav's expense. Return delivery will be by the most economical means. Should the Purchaser require that the Equipment be returned by a faster method, the costs incurred by the faster delivery will be pre-paid by the Purchaser.

3. No refund of the purchase price for the Equipment will be made to the Purchaser unless ComNav is unable to remedy the defect after having a reasonable number of opportunities to do so.

4. Warranty service shall be performed only by ComNav. Any attempts to remedy the defect by anyone else shall render the warranties set forth in this Warranty null and void.

CHOICE OF LAW AND JURISDICTION

This Warranty is governed by the laws of the Province of British Columbia, Canada. If the Purchaser acquired the Equipment outside of Canada, each of the parties hereto irrevocably attorn to the jurisdiction of the courts of the Province of British Columbia, Canada, and further agree to settle any dispute, controversy or claim arising out of or relating to this Limited Warranty, or the breach, termination, or invalidity of it, by arbitration under the rules of the British Columbia International Commercial Arbitration Centre ("BCICAC"). The appointing authority shall be BCICAC [or, if the BCICAC shall cease to exist, the Chief Justice of the Supreme Court of British Columbia]. BCICAC shall administer the case in accordance with BCICAC Rules. There shall be one arbitrator and the place of arbitration shall be Vancouver, British Columbia, Canada.

The United Nations Convention on Contracts for the International Sale of Goods Act, S.B.C 1990, c. 20, and any other statutory enactments of the United Nations Convention on Contracts for the International Sale of Goods do not apply to this Warranty.

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User Notes

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