# GN70

**SIMRAD**

**PRO SERIES**

Operator and Installation Manual

**ENGLISH**

# Preface

### Disclaimer

As Navico is continuously improving this product, we retain the right to make changes to the product at any time which may not be reflected in this version of the manual. Please contact your nearest distributor if you require any further assistance.

It is the owner's sole responsibility to install and use the equipment in a manner that will not cause accidents, personal injury or property damage. The user of this product is solely responsible for observing safe boating practices.

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This manual represents the product as at the time of printing. Navico Holding AS and its subsidiaries, branches and affiliates reserve the right to make changes to specifications without notice.
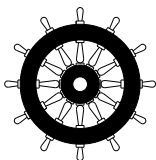
### Compliance

The GN70 system complies with the following regulations:

- IMO Res. MSC.112(73), IMO Res. MSC.114(73), IMO Res. A.694(17) and IMO MSC.191(79)
- CE

For more information please refer to our website:
http://pro.simrad-yachting.com/

### The Wheelmark

The GN70 system is produced and tested in accordance with the European Marine Equipment Directive 2010/68/EC and amemded by Directive 2011/75/EC. This means that the systems comply with the highest level of tests for nonmilitary marine electronic navigation equipment existing today.

The Marine Equipment Directive 2010/68/EC (MED), as amended by 2011/68/EC for ships flying EU or EFTA flags, applies to all new ships, to existing ships not previously carrying such equipment, and to ships having their equipment replaced.

This means that all system components covered by annex A1 must be type-approved accordingly and must carry the Wheelmark, which is a symbol of conformity with the Marine Equipment Directive.

Navico has no responsibility for the incorrect installation or use of the navigation eauipment, so it is essential for the person in charge of the installation to be familiar with the relevant requirements as well as with the contents of the manuals, which covers correct installation and use.

### FCC

This equipment has been tested 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. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment

does cause harmful interference, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or installer technician for help.

### Copyright

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### Warranty

The warranty card is supplied as a separate document.

In case of any queries, refer to our websites:
pro.simrad-yachting.com and www.simrad-yachting.com

### About this manual

This manual is a reference guide for operating the Simrad GN70 navigation system.

The manual will be continuously updated to match new software releases. The latest available manual version can be downloaded from our web sites.

Important text that requires special attention from the reader is emphasized as follows:

➔ *Note:* Used to draw the reader's attention to a comment or some important information.

> ⚠ **Warning:** Used when it is necessary to warn personnel that they should proceed carefully to prevent risk of injury and/or damage to equipment/personnel.

# Contents

# 1 Introduction

## The GN70 Front Panel and Keys
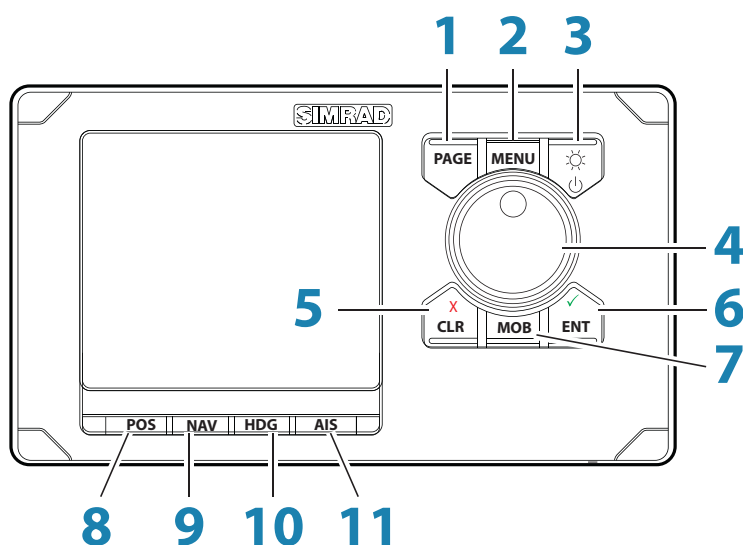


| No. | Key Description |
|---|---|
| 1 | **PAGE** key<br>Brings up different screen page every time this key is pressed or to change tab in the settings and tools menu. |
| 2 | **MENU** key<br>Brings up the quick menu dialog box. |
| 3 | **PWR/LIGHT** key<br>Short press - to turn ON the unit.<br>Momentary press brings up the backlight and night view controls.<br>Series of short presses will cycle through 6 levels of display brilliance.<br>Long Press - to turn power off. |
| 4 | **ROTARY KNOB**<br>Rotate to scroll through the menu icons or numbers in the virtual keypad.<br>Press the center of the knob to select menu item or accept entry. Same entry action when you press the **ENT** key. |
| 5 | **CLR** key<br>Press to clear, escape or back out of the menu or data entry. |
| 6 | **ENT** key<br>Press to accept menu selection or data entry. The same action as pressing the center of the rotary knob. |
| 7 | **MOB** key<br>Short press will save the present position L/L into the next vacant waypoint. Press and hold for 3 seconds activates the Man-Over-Board (MOB) function. |
| 8 | **POS** key<br>Hot key to display the present position Latitude, Longitude, COG, SOG, Date and Time. |
| 9 | **NAV** key<br>Hot key to display the navigation information. |
| 10 | **HDG** key<br>Hot key to show the compass rose, Pitch, ROT and Yaw information coming from a gyro or a GPS compass. |
| 11 | **AIS** key<br>Hot key to display the PLOT screen showing your vessel, waypoints, route and other navigation information.  Will show AIS targets when connected to an AIS receiver via the NMEA 2000 network. |

# The GN70 Screens
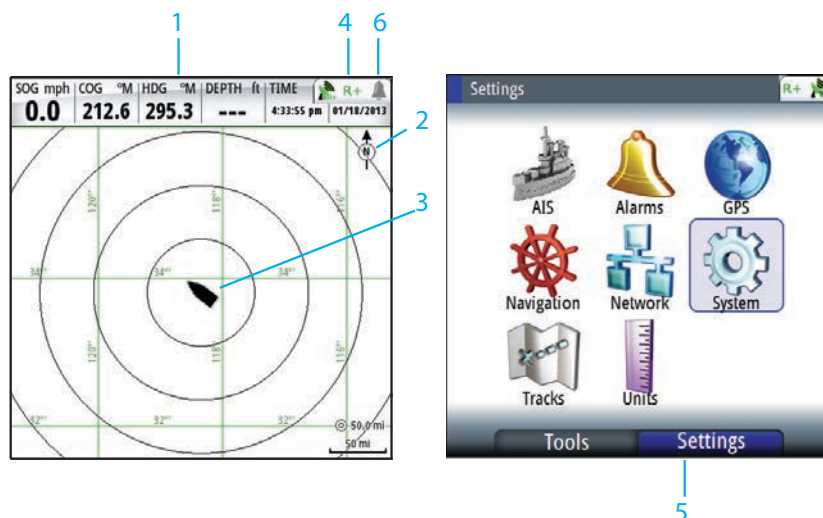


## 1 Instrument Bar

Navigation data is contained on the bar on top of the PLOT page. The PLOT is under the **AIS** key.

## 2 Plotter Orientation

Possible orientation of the plotter is North Up or Course Up.

## 3 Ship's location

Always located in the middle of the plot screen.

## 4 Status Bar

Appears on all navigation screens. It indicates the GPS and RAIM status or if an alarm is present (refer to Status bar indications below for more details). Normally, the status bar blinks off every 4 seconds to show what is behind it. This is not an alarm condition.

## 5 Main Menu

The main menu is used to operate the system and to adjust configuration settings. There are two tabs under the main menu, namely: Settings and Tools. To toggle between the Tools and Settings tab, press the **PAGE** button.

## 6 Alarm Icon

The system will continuously check for dangerous situations and system faults while the system is running. When an alarm situation occurs, an Alarm bell icon will appear on the status bar.

If you have enabled the siren, an audible alarm will be activated when an alarm situation occurs.
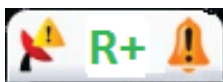
**Status Bar Indications**

**GPS Status**

| Icon | Description | Definition |
|------|-------------|------------|
| | No Position fix | Not tracking satellites (no position update). This is normal the very 1st time you turn on the unit. It takes a few seconds to get a fix. |
| | DGPS Position | Position Fix is differentially corrected using RTCM corrections from beacon stations. This is the normal operating condition. Position accuracy is less than 2 meters. |
| | DGPS Position | Position Fix is augmented using the WAAS signal correction. Position accuracy is less than 5 meters. |
| | Good GPS position | GPS Position fix is good but the RTCM correction signal is temporarily not available. When **DGPS** mode menu is set to either Beacon or WAAS. |
| | Good GPS position | Good GPS position fix indication when GN70 is operated in autonomous **GPS** only mode **DGPS** mode setting is OFF. |

**RAIM Status**

RAIM (Receiver Autonomous Integrity Monitoring) is a fault-detection feature required by IMO for type-approved GPS units. It is another layer of safety that alerts the operator that a condition may exists in the GPS positioning solution that reduces the desired accuracy of the ship's position. This feature requires at least five GPS satellites to operate properly, four satellites or less will indicate a RAIM caution condition (R?). If the statistical RAIM error exceeds a specified limit (100 meters-default) a RAIM Unsafe (R-) alarm will be indicated. This means that the RAIM estimated position error is equal or greater than the preset limit. The operator is advised to take extra precautionary measures when using the navigation solution until the RAIM indicator switches to RAIM safe (R+) condition.
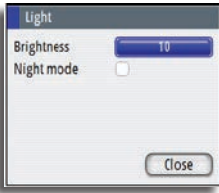
| Icon | Description | Definition |
|------|-------------|------------|
| R+ | RAIM Safe | Position error is less than 100 meters (RAIM limit). |
| R- | RAIM Unsafe | Position error is equal or more than the 100 meter RAIM limit. |
| R? | RAIM Caution | Not enough satellites are available. RAIM requires minimum of 5 satellites for proper operation. |
| | Alarm condition | A yellow bell icon indicates an alarm fault has been detected. The bell icon will be grayed-out when the alarm is corrected. |

# 2

# Basic operation

## The Light/Power key

| | | |
|---|---|---|
| | • Press and hold: | Turn unit off |
| | • Single press: | To turn ON or display dialog for *light/night* mode adjustment |
| | • Repeated presses: | Toggle preset brightness levels (10 - 6 - 3- 1) |
| | • Check box | To switch to *night* mode operation |

➔ Notes:

1. The GN70 goes through its boot-up routine as soon as external power is applied. It will be ready to turn on in about 30 seconds. The succeeding turn on time will be instantaneous thereafter as long as the external power is not disconnected.

2. If the **POWER** key is released before shut-down is completed, the power off is cancelled.

### Night mode

The *Night* mode optimizes the color palette for low light conditions. To activate, rotate the knob until the *night* mode check box is highlighted, then press the **ENT** key.

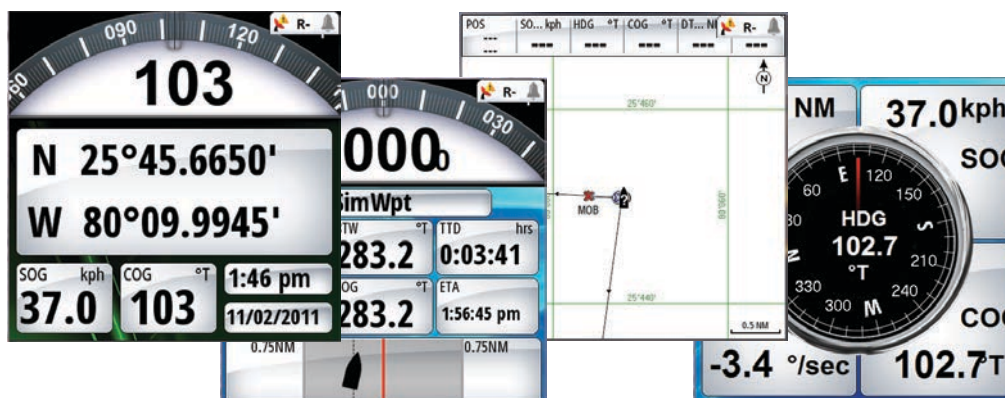➔ *Note.* Details on the display may be less visible during Day time when the *Night* mode is selected!

The display backlight can be adjusted in two ways by using the rotary knob (10 steps) or by pressing the **LIGHT/POWER** key repeatedly.

## The PAGE key

### Select Pages

You can view the different navigation display pages sequentially by pressing the **PAGE** button repeatedly.



You can also view the navigation pages directly by pressing the hot keys at the bottom of the display. The **PAGE** key is also used to change tabs or toggle between the Tools and Settings screens of the main menu.

## The MENU key
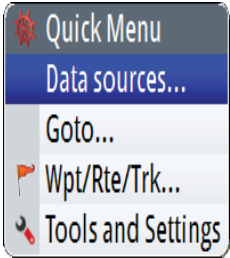
Menus are used to operate the system and to adjust configuration settings.

You display the menu by pressing the **MENU** button to bring up the "Quick Menu". Using the rotary knob, scroll down to Tools and Settings and press the **ENT** key . The main menu will have two tabs, namely: Tools and Settings. Pressing the **PAGE** key will toggle the display between the Tools or Settings tabs.

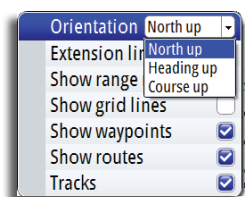| | | |
|---|---|---|
| MENU | • Pressing the **MENU** key brings up the quick menu for the particular screen on the display | Quick Menu<br>Data sources...<br>Goto...<br>Wpt/Rte/Trk...<br>Tools and Settings |
| | • Scroll down to the Tools and Settings then press the **ENT** key to display the main menu | |

- You can scroll through the menu icons by using the rotary knob and then pressing the **ENT** key or middle of the knob to select.
- Adjust slide bar values by turning the rotary knob clockwise (CW) or counterclockwise (CCW) direction.
- Drop-down listings are selected by pressing the **ENT** key when the highlight is at the selected item.



| | | |
|---|---|---|
| Settings Menu | Tools Menu | Drop-down listing |

If you do not want to accept the entry or need to exit the setup screen, press the **CLR** key to return to previous menu level or to exit.

## Dialog boxes

Select entry fields and keys in a dialog box by using the rotary knob then pressing the center of the knob or the **ENT** key. You can only enter information when the selected field is highlighted.

Virtual numeric or alphanumeric keyboards will automatically be displayed when required for entering user information in dialogs.

Pressing the **ENT** key after entering the required value(s) will select the entry. Highlight the **OK** button and press **ENT** will save the entry.

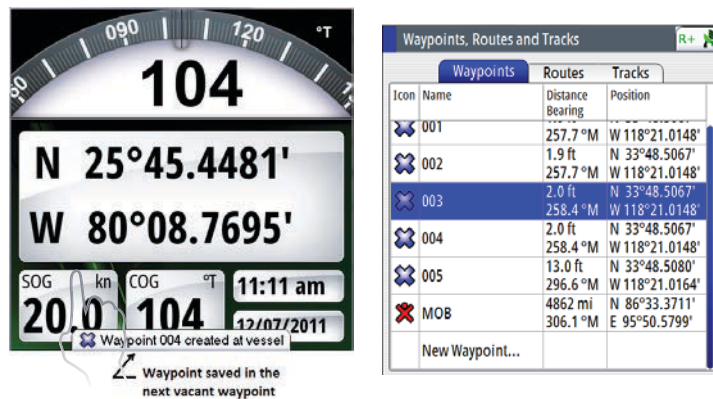A dialog is closed without saving by pressing the **CLR** key.

## The MOB (Man-Over-Board)/Mark key

Marking or saving the present position into waypoint memory is accomplished by pressing the **MOB** key momentarily. The marked point can be renamed or edited thereafter and be made into a regular waypoint if needed.



If an emergency man over board situation should occur, you can position a Man Over Board mark at the vessel's current position by pressing the **MOB** key for 3 seconds. When you activate the MOB function the following actions are automatically performed:

• A MOB mark is positioned at the vessel's position.
• The display switches to NAV screen showing the range and bearing going back to the MOB point.
• The GN70 creates an active route to the MOB mark.

➔ *Note:* Press the **AIS/PLOT** key to show the relative location of the MOB point from your vessel.
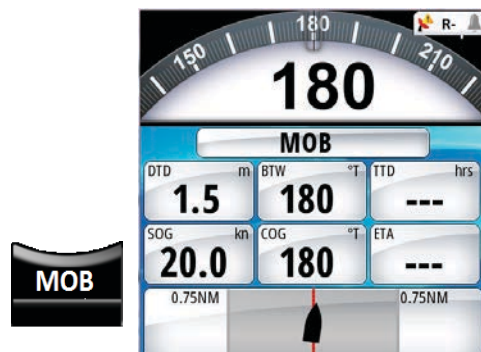


### Cancel MOB navigation

The GN70 will continue navigating towards the MOB point until you cancel this navigation. To cancel MOB, press the **MENU** key, highlight "Cancel navigation" then press the **ENT** key. Press any hot key to exit.

### Delete a MOB mark

A MOB mark is deleted by selecting the MOB mark in the WPT list and then pressing the **MENU** key and selecting delete. It can also be deleted as described in "Waypoints, Routes & Tracks" on page 31.

## GN70 hot keys

The four keys below the display are called hot keys because they can bring up the position, navigation, heading and AIS (plot) screens directly when pressed.

### The POS key

Pressing the **POS** key will bring up the position screen. This display indicates the present position Lat/Long, SOG, COG, Date/Time and the compass heading.



### The NAV key

Pressing the **NAV** key will bring up the navigation screen showing the WPT# you are headed to, the range, bearing, SOG, COG and ETA to destination. It also shows the graphical display of the cross-track error.
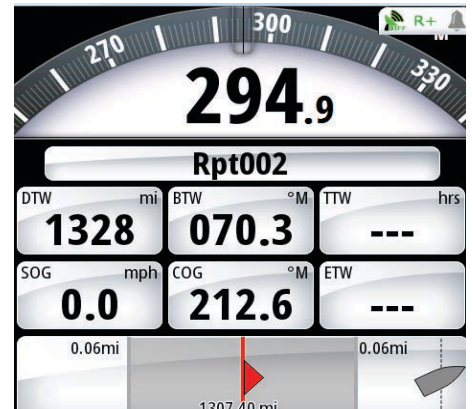


### The HDG key

Pressing the **HDG** key will bring up the compass rose, pitch, roll, ROT and yaw when a gyro, HS80 or MX575C GPS compass is available in the NMEA 2000 network.
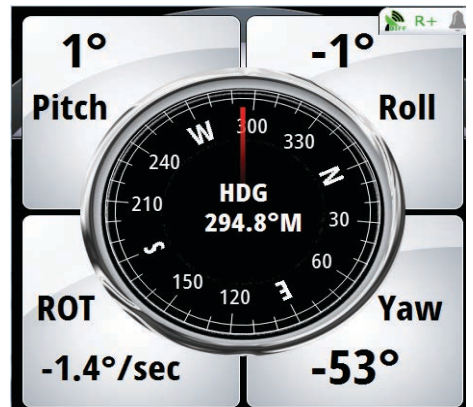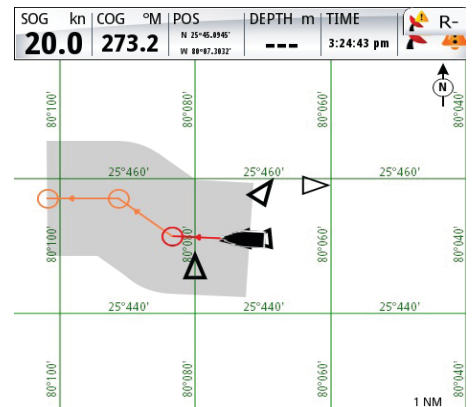


### The AIS key

Pressing the **AIS** key will bring up the plotter screen that will show your boat in the middle of the screen, wpts, routes and AIS targets if an AIS unit is available in the NMEA 2000 network.
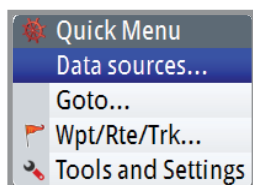
# 3

## Menu overview

### The Quick Menus

The Quick menus are mode dependent and contains the most common used settings for the active display screen. Pressing the **MENU** key one time brings up the quick menu. Each Quick menu have access to the main Tools and Settings menus.

#### Quick Menu under POS, NAV and HDG screens

From the Quick menu for *POS*, *NAV* and *HDG* screens, you can change the data sources used for positioning, navigation, etc. or you can Goto a waypoint or route. Using Auto Select will automatically search for the data source that is connected in the NMEA 2000 network. You can also create waypoints, routes or tracks or bring up the Tools and Settings menu.
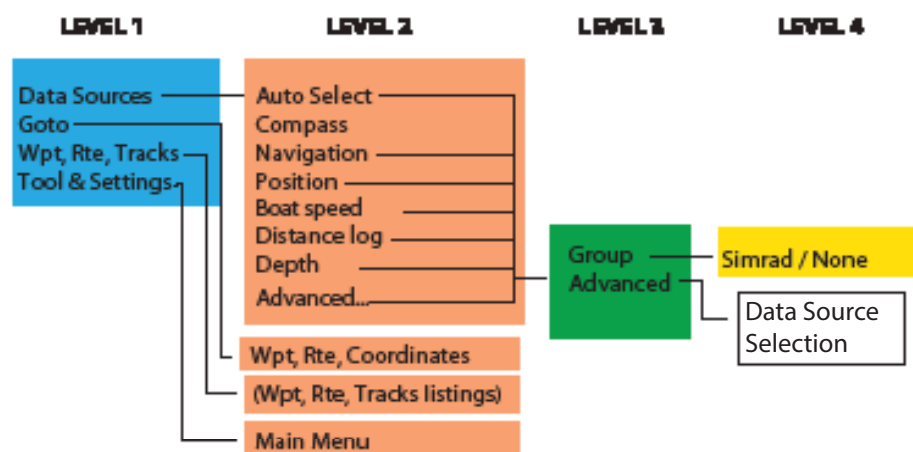
#### Quick Menu in AIS (PLOT)

Under the AIS (PLOT) screen the quick menu can be used to Goto a destination wpt, route or L/L coordinates. Below is the AIS screen quick menu map.
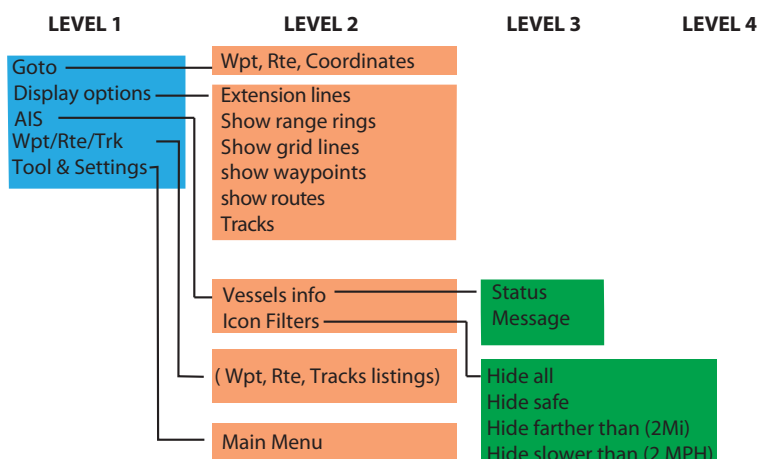
### The Settings dialog and submenus

The system is configured and most system settings defined during installation and commissioning of the system.

The settings parameters are logically grouped, and each group is presented with an icon in the Settings page. This page is accessed by pressing the **MENU** key, highlight the Tools & Settings then press the knob (or **ENT**). A settings menu map is shown below:

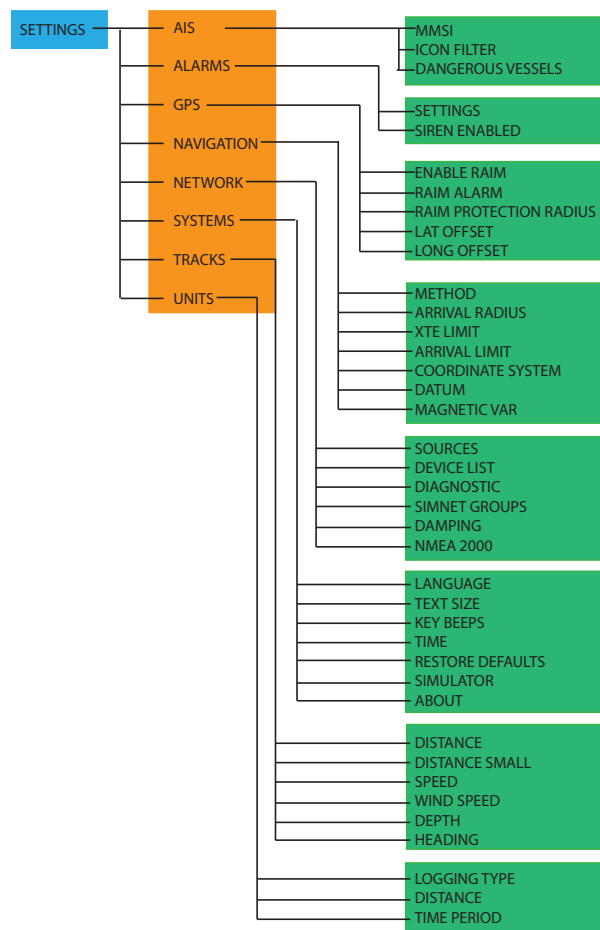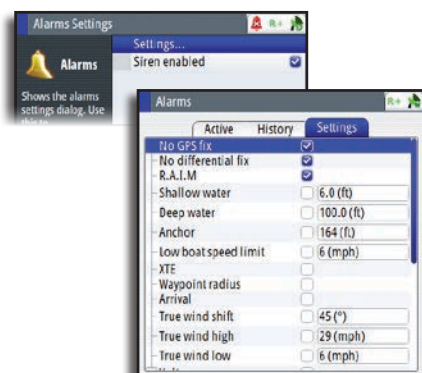| SETTINGS | | |
|---|---|---|
| AIS | | MMSI |
| | | ICON FILTER |
| | | DANGEROUS VESSELS |
| ALARMS | | SETTINGS |
| | | SIREN ENABLED |
| GPS | | ENABLE RAIM |
| | | RAIM ALARM |
| | | RAIM PROTECTION RADIUS |
| | | LAT OFFSET |
| | | LONG OFFSET |
| NAVIGATION | | METHOD |
| | | ARRIVAL RADIUS |
| | | XTE LIMIT |
| | | ARRIVAL LIMIT |
| | | COORDINATE SYSTEM |
| | | DATUM |
| | | MAGNETIC VAR |
| NETWORK | | SOURCES |
| | | DEVICE LIST |
| | | DIAGNOSTIC |
| | | SIMNET GROUPS |
| | | DAMPING |
| | | NMEA 2000 |
| SYSTEMS | | LANGUAGE |
| | | TEXT SIZE |
| | | KEY BEEPS |
| | | TIME |
| | | RESTORE DEFAULTS |
| | | SIMULATOR |
| | | ABOUT |
| TRACKS | | DISTANCE |
| | | DISTANCE SMALL |
| | | SPEED |
| | | WIND SPEED |
| | | DEPTH |
| | | HEADING |
| UNITS | | LOGGING TYPE |
| | | DISTANCE |
| | | TIME PERIOD |

## AIS settings



Used to enter the MMSI number of the vessel, set the icon filters to show or hide vessel targets and set limits for dangerous vessels based on distance or time of closest point of approach (CPA).

## Alarms settings



This screen is used to manage and control the alarm feature. Press the **PAGE** key to change tabs

-Settings tab is used to turn on/off alarms and set limits.

-History tab lists all previous alarms.

-Active tab shows alarms that are still active. The alarm is removed from the list when the cause is corrected.
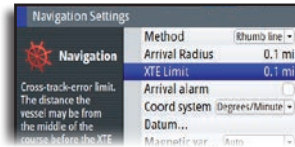
## GPS settings.
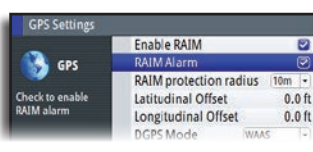


Settings for the GPS RAIM (Receiver Autonomous Integrity Monitoring) feature, alarm and radius. Controls antenna offset function.
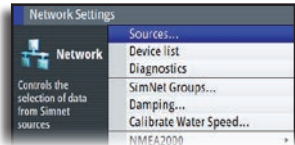
### Navigation settings

Controls the navigation calculation to either the Great Circle or Rhumb line method. You can also specify the limits for arrival and cross track error (XTE).

### Network settings

List of devices connected to the CAN bus network.

Used for setup, diagnostics and configuration.

### Systems settings
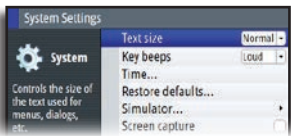
Controls the text size, key beeps, time, restore defaults, activate the simulator feature, special product options and information about the software and hardware of the unit.

### Tracks settings
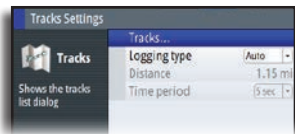
Shows the tracks list dialog and logging type.

### Units settings
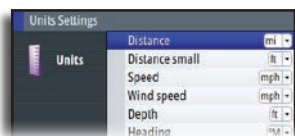
Controls the units used for distance, depth, speed and heading.

## The Tools dialog and submenus

Several tools are available to help you operate the GN70 unit. To bring up the TOOLS page, press the **PAGE** key to change tab from SETTINGS to TOOLS.

## AIS tool


AIS



Two tabs are available in this submenu, namely: Status-All and RX Messages. Press the **PAGE** key to change tabs. The Status-All provides a list of targets received from AIS or GMDSS as well as their distance and bearing with reference to your vessel. The RX message tab, provides a list of text messages received from other AIS enabled vessels who sent you a directed or broadcast message.

## Alarms tool


Alarms



This screen is used to manage and control the alarm feature. Press the **PAGE** key to change tabs

-Settings tab is used to turn on/off alarms and set limits.

-History tab lists all previous alarms.

-Active tab shows alarms that are still active. The alarm is removed from the list when the fault is corrected.

## Satellite tool


Satellites



Provides the status display of the GPS satellites and differential correction data. Press the **PAGE** key to change tab to DGPS status screen.

## Waypoints, Routes and Tracks tool


Waypoints, routes, tracks



This tool submenu allows you to create waypoints, routes and start tracks. Pressing the **PAGE** Key will change tab to Waypoint, Route and Tracks page.

## Trip Log tool


Trip log



You can track the distance travelled using the two trip meters as well as the overall distance travelled in the today page. To reset, highlight the **Reset** button and press the **ENT** key. Change tab by pressing the **PAGE** key.

## Sun/Moon tool



Calculates the sun and moon setting and rising.

## Tide tool



Calculates the tides based on manually entered tide harmonics taken from the Admiralty Tide Table book.

# 4  The Tools page

Several tools are available to help you operate the GN70 unit.  To bring up the TOOLS page, press the **MENU** key then scroll to Tool and Settings menu. Press the **PAGE** key to change tab from SETTINGS to TOOLS. Turn the knob to highlight the desired icon and press the **ENT** key to select it. The Tools dialog includes options and tools that are not specific to any display page. A tools dialog will open on top of your previous page. Press any hot key to exit or press the **CLR** key to return to last active page.

Any listing in the tools dialogs has a page menu, giving access to available options for the selected item.
Below is the Tools menu map:
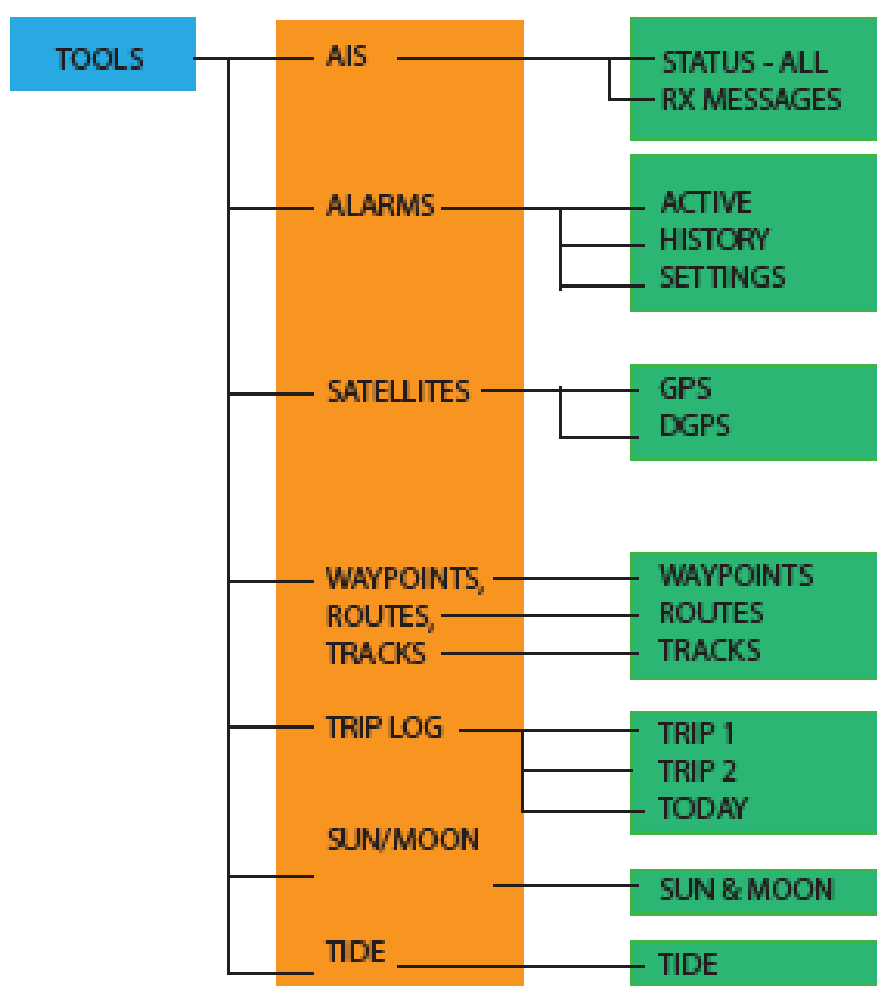
# AIS (Vessel info)

### Status-All

Provides a list of all AIS target vessels with their information when the GN70 is connected to the AIS transponder via the NMEA 2000 network.

Pressing the MENU key will show a dialog box that allows you to sort the list based on names, distance, bearing, status, type, CPA and TCPA to other vessels.
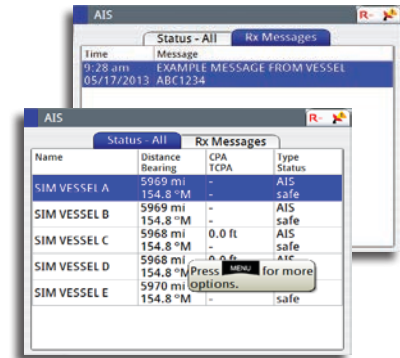
### Message listing

Shows the list of all text messages received from other vessels with time/date stamp.

# Alarms

### Active alarms

List of active alarms.

### Alarm history

List of all previous alarms with time stamp and description.

### Alarm settings

List of all available alarm options in the system, with current settings.
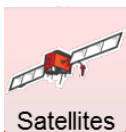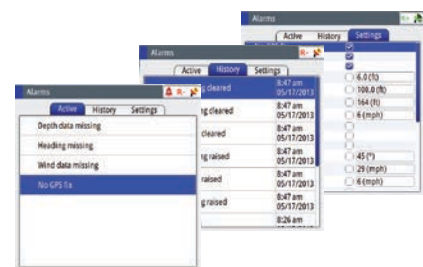
# Satellites

Status page for GPS satellites that are in view. The SBAS (like WAAS, EGNOS) differential position correction can be turned On or OFF using the configure button. The source of GPS position can be controlled from this screen if there are more than one active antenna connected in the N2K buss.  Pressing the PAGE key will change the tab to the DGPS status screen.
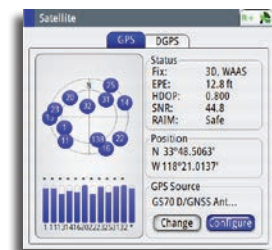
# Waypoints/routes/tracks

The databank of waypoints, routes and tracks can be viewed from this display. Pressing the PAGE key repeatedly will change tabs from Waypoints, Routes or Tracks.

Creating new or editing existing waypoints, routes and tracks can be done in this screen. Pressing the MENU key while in this screen will allow you to easily GOTO the waypoint you selected or activate the Route to follow pre-programmed routes or tracks.
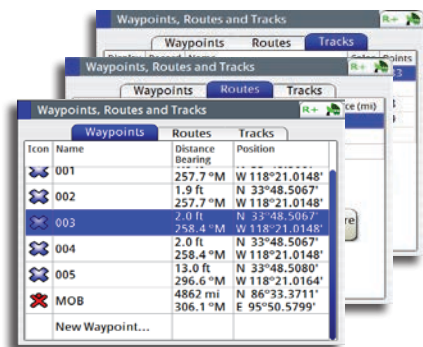
## Trip Log

**Trip 1 / Trip 2**

Displays voyage and engine information, with reset option for all data fields.

**Today**

Displays voyage and engine hour information for current date. All data fields will be automatically reset when the date changes.

## Sun/moon

Displays sunrise, sunset, moonrise and moonset based on entered date and position.

## Tides

Displays tide information for the tide station nearest to your vessel.

Tide station harmonics needs to be entered manually using station information from the Admiralty Tide Reference table. Use the ROTARY KNOB to scroll through time.
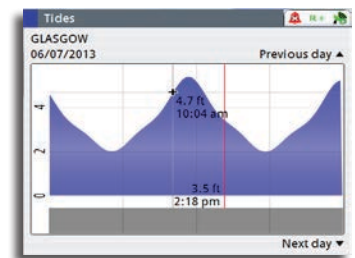
Procedure to add a new tide station:

1. Press the **MENU** key to bring up the quick menu
2. Select Tools and Settings menu then press the **ENT** key
3. Press the **PAGE** key to change tab to Tools
4. Scroll to TIDES using the ROTARY KNOB
5. Press the **ENT** key
6. Press the **MENU** key to bring up "Change Tide Station"
7. Press the **ENT** key
8. Highlight the "New Tide Station" field
9. Using the ROTARY KNOB, scroll to the top of dialog box and enter the station ID number, name of the place and all the Harmonic constants taken from the Admiralty Tide Station book
10. Highlight the **SAVE** button
11. Press the **ENT** key
12. Press the **CLR** key to exit.

# 5

# System Configuration

## General

When the GN70 system installation is completed or when the unit is restored to the default settings, a simple network configuration to select the data source is needed. This can be done during the initial turn on. A series of dialog boxes will prompt you through the setup process. Answering yes by pressing the **ENT** key will initiate the auto selection of the antenna unit. Failure in setting up the GN70 correctly will prohibit the navigation system from functioning properly.

For installation with more than one display or more than one antenna unit, some setup is required to assign an antenna to a display unit. This section will help you perform the proper setup.

## The Quick Menu Dialog and Submenus

The network configuration settings can be accessed through the quick menu or through the Tools and Settings, then Network submenu. This dialog is accessed by pressing the **MENU** key then selecting Data sources menu or by highlighting the Tools and Settings and then select the Network
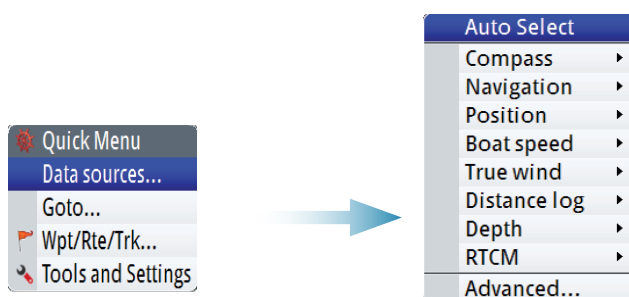


## Network Settings

Setup and selection of sources can also be done in the Network menu.

### Selecting Data Sources

A data source can be a sensor or a device connected to the network, providing data to other devices. Data can be of different type such as position data, compass data, depth data, etc.

Source selection is required on initial start up of the system with multiple devices, if any part of the CAN bus network has been changed or replaced, or if an alternative source is made available for a given data type and this source has not been selected automatically.

At the first time turn on of a group of SimNet interconnected products, data sources are automatically selected from an internal SimNet priority list. If a data source is connected to SimNet after the first time turn on, this will be identified and automatically selected if no other data source already is selected for the given data type.

You can let the system automatically select your sources, or set up each source manually as described below.

### Auto Select

The Auto Select option will look for all SimNet sources connected to the network. If more than one source is available for each data type, the system will automatically select from an internal priority list.

The Auto select function is mainly for situations where the automatic source selection needs to be updated because a selected data source is not supplying data or has been physically replaced with another one. The update secures that the existing source selections are valid and maintained. Missing sources are either automatically exchanged with an alternative source from the list of available sources for the given data type, or the replacing source is selected.
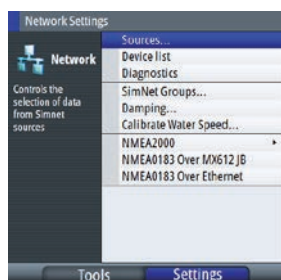
**Manual Source Selection**

You can manually select the preferred source. This is useful if you have more than one of the same type of device (i.e. multiple GPS antenna units) on the network.

Available sources are listed as shown in the example below. You select active source by ticking the preferred unit. Each GS70 antenna is noted with a serial number (i.e. 100E32#).
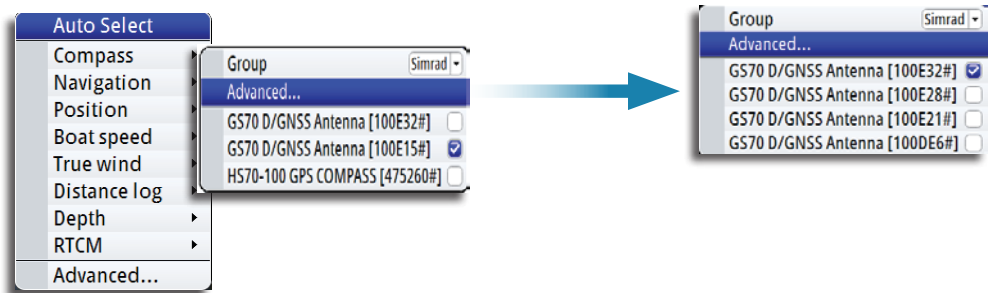


*Group selection*

The GN70 can use GPS antennas or data sources that all other products on the N2K network use, or you may select individual sources for the GN70 system.

If the group is set to "Simrad", any changes to a source will also affect other display systems on the network.

If the group is "None", the selected source will be used for that particular GN70 unit only.

*Advanced selection*

Allows the automatic selection of sources available on the network.

## Device List

From the device list you can:

- List all of the active SimNet and NMEA 2000 devices on the network, showing model description and serial number. Devices can be sorted by model ID or by serial number
- Display information relating to a device such as, name, manufacturer, software version, instance, status
- Give the device a logical name relevant to the user (Ant#1 or FWD Ant., etc.)
- See data coming from the device
- Get access to configuration page for the device.
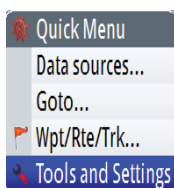


Displaying the Device List

1. Press the **MENU** key
2. Highlight the "Tools and Settings", then press the knob or the **ENT** key
3. Scroll to NETWORK icon and press the **ENT** key
4. Scroll to "Device List" then press the **ENT** key. This will bring up the list of all devices that are in the N2K network
5. Scroll to the device desired (i.e. GS70, MXJB-Ch1, etc.) then press the **ENT** key to bring up the Device Information screen. This screen shows you the Device model, Name, Manufacturer, Software Version, Address, s/n, Status, etc.
6. Scroll to the Data button and press the **ENT** key. This will display the Data List for the selected device
7. Highlight the Close button and press the **ENT** key or press the **CLR** key to exit.
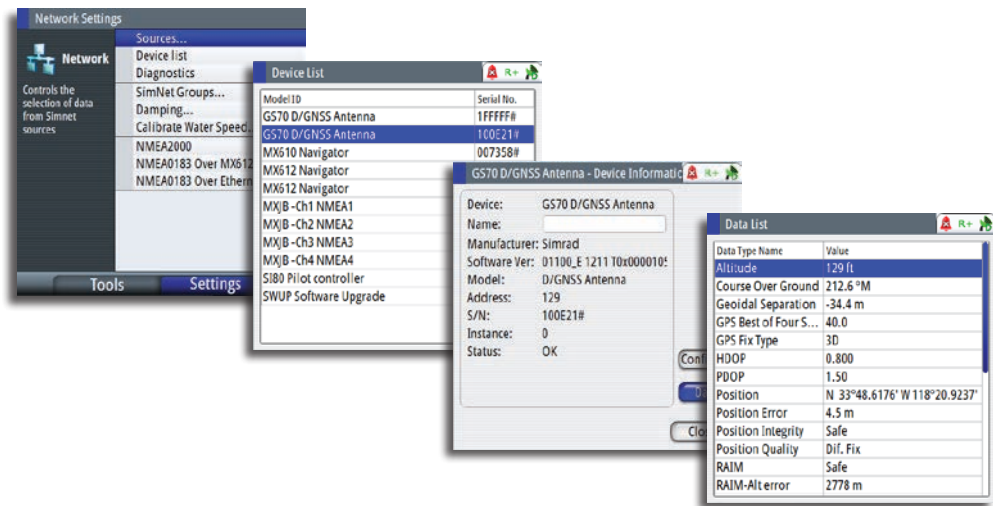
## Diagnostics

The diagnostic page shows details for the NMEA 2000/CAN bus network.
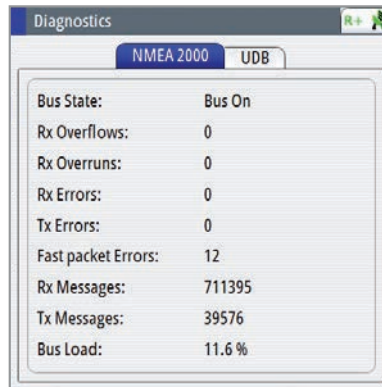


| Option | Description |
|---|---|
| Bus State | Indicates if network backbone is operating. if no data is detected, check power and check the terminations |
| Rx Overflows | Value greater than 0 could indicate the software is very busy and unable to keep up with incoming messages |
| Rx Overruns | |
| Rx Errors | CAN interface error counters. Count up when there are errors on the CAN bus, and down when things are okay. Should normally be 0. The bus power is off when 255 is reached. Check same things as for Bus state if greater than 0 observed |
| Tx Errors | |
| Fast packet Errors: | Detected errors since power up. Check the network if this is continually increasing |
| Rx Messages | A count since power up of messages received / transmitted |
| Tx Messages | |
| Bus Load | Real time bus load in percentage of max capacity |
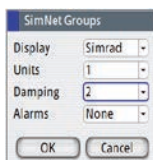
## SimNet Groups

The SimNet Group function is used to control parameter settings, either globally or in groups of units. The function is used on larger vessels where several SimNet units are connected via the network. By assigning several units to the same group, a parameter update on one unit will have the same effect on the rest of the group members.

The illustration below shows a network of three GN70 units (two on the bridge and one in the remote area). The two units on the bridge can be made to belong to one group (i.e. Group #1) so that when the backlight and damping settings is adjusted in one of the bridge units, the other GN70 display settings will also change. The third GN70 unit in the remote location which does not belong to group #1 will not be affected.
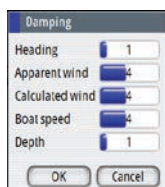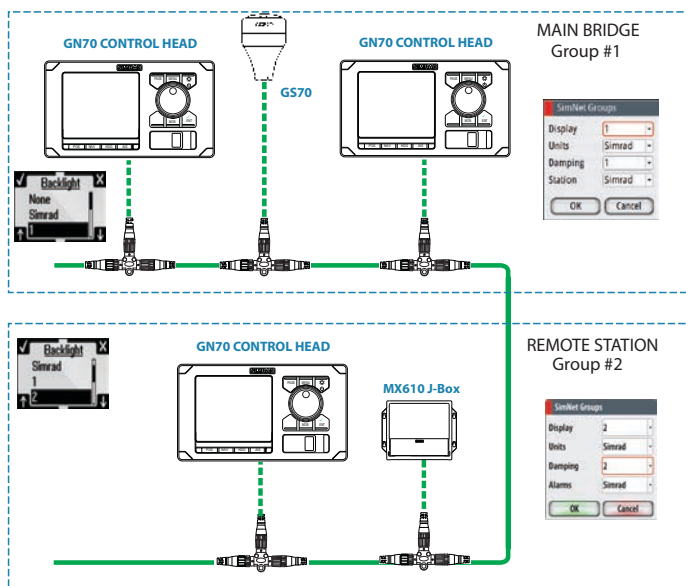
## Damping

Controls how quickly the display updates values from sensors.

Increasing the damping applies more averaging or smoothing of the data update rate on the display.

Damping settings are applied to SimNet units belonging to particular damping SimNet Groups.

→ *Note:* If the damping factor for heading is high, the captured heading might differ from the heading read on the display when using the heading capture function.

### HS70/HS80/MX575C D/GPS Compass Antenna Offset

The difference between the compass lubber line and the boat's center line should be compensated for. This can be done in two ways, namely: physically rotating the compass antenna so the heading is corrected or by entering an offset value using the procedure below. This offset value is saved in the antenna unit.

Entering heading offset procedure:

1. Find the bearing from the boat position to a visible object. Use a chart or a chart plotter
2. Steer the boat so that the center line of the boat is aligned with the bearing line pointing towards the object
3. Activate the device configuration dialog as shown below, by pressing the **MENU** key
4. Scroll to Tools and Settings, press the **ENT** key
5. Scroll to NETWORK icon, press the **ENT** key
6. Scroll to Device list, press the **ENT** key
7. Scroll to Compass, press the **ENT** key
8. Highlight the GPS compass unit being used, press the **ENT** key
9. The highlight will be in Configure button, press the **ENT** key
10. Highlight the Offset field, press the **ENT** key. The virtual keypad will show
11. Highlight (+) or (-), press the **ENT** key
12. Scroll to Enter the offset, press the **ENT** key
13. Enter the offset value using the virtual keypad
14. Highlight OK, press the **ENT** key
15. Highlight the Close button, then press the **ENT** key
16. Press the **HDG** hot key to exit.
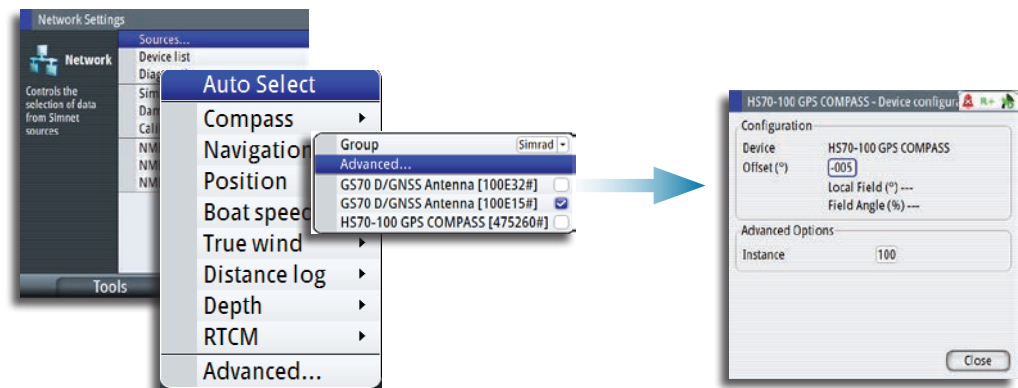


➔ *Note:* Make sure that both the compass heading and the bearing to the object have the same unit (Magnetic or True).

### NMEA 0183 Output over TCP/IP (LAN)

The GN70 has the capability to output NMEA 0183 over the Ethernet (LAN) port. Since there is no bandwidth restrictions in LAN, all listed NMEA messages are transmitted (see message table below). The data of the sentences comes from the data source selected.

### List of NMEA messages supported in LAN

| NMEA Message | Description |
|---|---|
| GGA | GPS system fix data |
| GLL | Geographic position |
| GSA | GNSS DOP and Active Satellites |
| GSV | GNSS Satellites in view |
| GRS | GNSS Range Residuals |
| GBS | GNSS Satellite Fault Detection |
| GNS | GNSS Fix Data |
| APB | Autopilot Sentence "B"d |
| VTG | Course over ground and speed over ground |
| ZDA | Time and Date |
| DTM | Datum |
| RMC | Recommended minimum specific GNSS data |
| AAM | Waypoint arrival alarm |
| BOD | Bearing - Origin to destination |
| MTW | Water temperature |
| XTE | Cross-Track error |
| DBT | Depth below transducer |
| VHW | Water speed and heading |
| HDG | Heading, deviation and variation |
| VLW | Distance Traveled through the Water |
| MWV | Wind Speed amd Angle |

➔ *Note:* NMEA 0183 over LAN is enabled by default, no user operation is required to turn it on/off.

### NMEA 0183 Output via AT-10 converter

The SIMRAD AT-10 unit is a single channel NMEA 2000 to NMEA 0183 converter that allows you to output limited NMEA 0183 sentences from the GN70 unit . This optional equipment can output limited NMEA messages (i.e. GLL, VTG, RMB, RMC, and APB messages). There is no setup or control available for this feature.

### NMEA 0183 output over junction box

This feature is only possible when the optional MX610JB junction box is available in the N2K network. The MX610JB junction box is a NMEA 2000 to NMEA 0138 converter. It has four RS-422 NMEA 0183 data ports that the GN70 can control. When the GN70 senses the presence of the MX610JB junction box, it will allow the operator to turn on and control the NMEA messages for each port. Limit the number of NMEA messages to eight per port.

When an optional MX521A smart antenna is connected through the junction box (via ports 3 & 4) the user will be able to control ports 1 and 2 only. In this situation, the ports 3 and 4 will be grayed out.

To activate the NMEA 0183 port, use the procedure below:
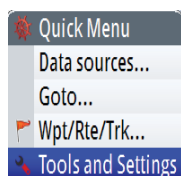
1. Press the **MENU** key
2. Turn the rotary knob to scroll down to Tool & Settings menu then press **ENT**
3. Scroll to Network then press **ENT**
4. Scroll down to NMEA 0183 over junction box then press **ENT**. A list of port numbers will be shown
5. Scroll to the port you want to use (i.e. Port 1) then press **ENT** to bring up the "Port# -Device configuration" dialog screen
6. Scroll to the Output sentences button then press **ENT** to bring up the NMEA 0183 Output Sentences dialog window
7. Scroll to the GPS and press **ENT** to expand the list of NMEA messages related to GPS positioning
8. Scroll to the desired NMEA message (i.e. GGA, VTG, etc.)
9. Turn on the NMEA sentence by pressing the **ENT** key to put a check mark on it
10. Press the **CLR** key to go back to the dialog screen
11. Highlight the CLOSE button then press **ENT**
12. Press any hot key to exit.
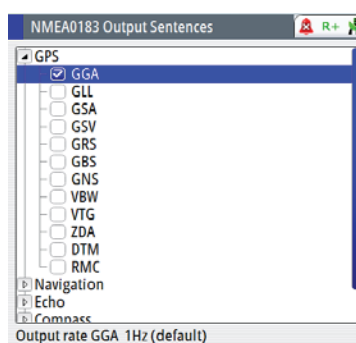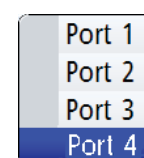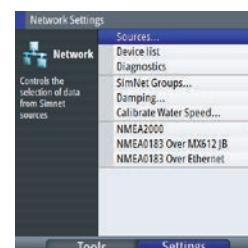
➔ *Notes:*

1. The number of NMEA 0183 messages that can be save in the memory of the MX610JB junction box is eight (8) NMEA sentences per port. If this is exceeded, the NMEA 0183 messages will still be transmitted, however, when the power is turned off in the junction box, only the first 8 sentences will be saved. The 9th and higher sentences will not be available next time the power is turned on.
2. When a NMEA 0183 smart antenna is connected to the junction box (i.e. MX521A or MX575C), ports 3 and 4 will be used for this connection. These ports will be grayed out and will not be usable for NMEA 0183 output.

**List of NMEA messages supported by the Junction Box**

| Classification | NMEA Message | Description |
|---|---|---|
| GPS | GGA | GPS system fix data |
| | GLL | Geographic position |
| | GSA | GNSS DOP and Active Satellites |
| | GSV | GNSS Satellites in view |
| | GRS | GNSS Range Residuals |
| | GBS | GNSS Satellite Fault Detection |
| | GNS | GNSS Fix Data |
| | VBW | Dual Ground/Water Speed |
| | VTG | Course over ground and speed over ground |
| | ZDA | Time and Date |
| | DTM | Datum |
| | RMC | Recommended minimum specific GNSS data |
| NAV | AAM | Waypoint arrival alarm |
| | BOD | Bearing - Origin to destination |
| | BWC | Bearing and Distance to Waypoint |
| | XTE | Cross-Track error |
| ECHO | DPT | Depth |
| | VHW | Water speed and heading |
| Compass | HDG | Heading, deviation and variation |
| | HDT | Heading, True |
| | ROT | Rate of Turn |
| | THS | True heading and status |

## Multi-Hz feature

For navigation applications that require more than 1 position per second data output, the GN70 can configure the GS70 antenna and the MX610JB junction box NMEA ports to output the NMEA sentences up to 10 Hz position. Use the setup procedure below to turn on the multi-Hz output feature:
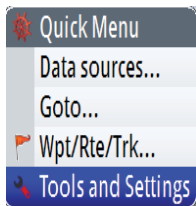
### GS70 antenna setting:

1. Press the **MENU** key
2. Select the Tools and Settings then press **ENT**
3. Higlight the GPS icon then press **ENT**
4. Select Advance configuration then press **ENT**
5. Select Position update rate then press **ENT** to bring up the drop-down submenu
6. Selection rates are 1,5 or10 Hz. Select desired speed then press **ENT**
7. Press the **CLR** button to go back to main menu.

### GN70 port setting:

1. Highlight the Network icon then press **ENT**
2. Scroll down to NMEA 0183 over junction box menu then press **ENT**. A drop-down list showing the port numbers will be shown
3. Scroll to the port# you want to use (i.e. Port 1) then press **ENT** to bring up the list of NMEA messages
4. Scroll to GGA then press **MENU**
5. Select 10 (for 10 Hz) then press **ENT**
6. Repeat the steps 11-12 for other NMEA sentences that you want to use
7. Press the **CLR** key or any hot keys to exit.
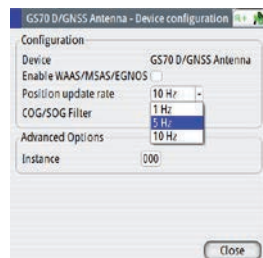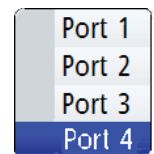
# 6

# Waypoints, Routes & Tracks

## The Waypoints, Routes and Tracks panels

The Waypoints, Routes and Tracks panels gives access to advanced edit functions and settings for all these items available on your system.

The edit and settings options are accessed from the tools menu or by using the dialog buttons when one of the items is selected.
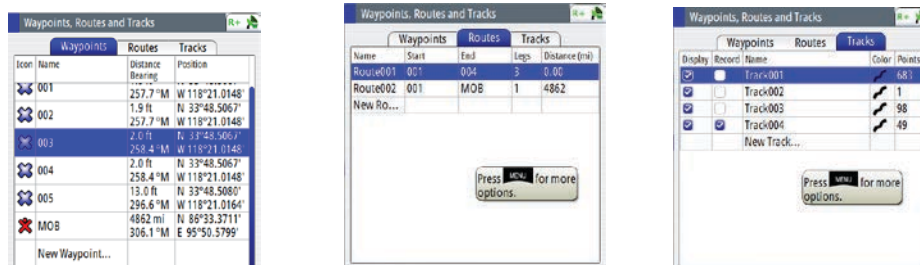


## Waypoints

A waypoint is a location on the chart defined by unique latitude and longitude coordinates. They can be created in the GN70 using the following methods:

- Saving the vessel position
- Using Lat/Long coordinates taken from a chart
- Specified range and bearing.

### Positioning waypoints

Saving the vessel's position as a waypoint

The easiest method to create a waypoint is by saving the vessel's position. This is done by a momentary press of the **MOB** key. This action will save the position Lat/Long into the next vacant waypoint number.

→ *Note:* The **MOB** key is a two function key. A momentarily press saves the position L/L into the next vacant waypoint. Press and hold the **MOB** key for 3 seconds, will save the position as MOB and will calculate range and bearing back to that point.

### Creating or editing waypoints

A Waypoint can be created (or edited) by using the procedure below:

1. Press the **MENU** key to bring up the quick menu
2. Scroll to Wpt/Rte/Trk... and press the **ENT** key
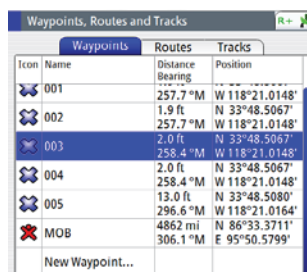


3. Turn the rotary knob to highlight the "New Waypoint..."
4. Press the **ENT** key to bring up the waypoint dialog box

→ Note: You may also press the **MENU** key to bring up the sub-menu and then select "New..." for a new waypoint entry, then press the **ENT** key.
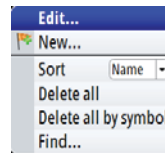
The position L/L coordinates is copied on the waypoint position field for a new waypoint.
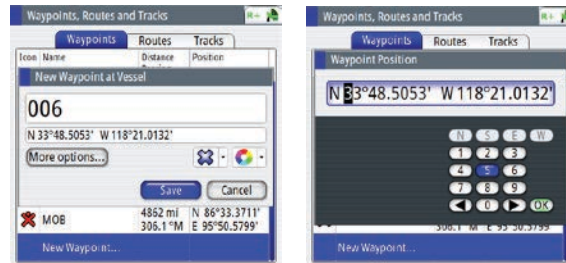


5.  Rotate the knob to move the highlight to the Waypoint L/L field, then press the **ENT** key. The virtual numeric keypad will appear

6.  Rotate the knob to highlight the left (or right) arrow key and press the center of the knob to shift the cursor to the digit you wish to change, then press the **ENT** key

7.  Change the number by using the combination of the rotary knob and virtual numeric keypad, then press the **ENT** key.  Do this for each digit you want to change

8.  When all the digits are entered, highlight the **OK** button then press the **ENT** key to finish entry

9.  Other items like the symbol color, waypoint name or other options can also be accessed in this screen. The alarm radius and depth can be entered in the options dialog box

10. Scroll to **SAVE** button and press the **ENT** key to save the information.

➔   Note:  Pressing the center area of the rotary knob is the same action as pressing the **ENT** key.

### Waypoint Alarm Settings

You can set an alarm radius for each individual waypoint you create.

1.  In waypoint menu table, highlight waypoint title tab and press center of knob

2.  From Edit Waypoint menu, scroll to Alarm Radius section, highlight field and press **ENT** key

3.  With virtual keypad, use the cursor to change each digit. Range 00 to 99. Click the **SAVE** button.

➔   Note: The waypoint radius alarm must be toggled ON in the alarm panel to activate an alarm when your vessel comes within the defined radius.

### Deleting waypoints

You can delete waypoints using the *Delete All* menu command or you can delete a specific group of waypoints with *Delete all by symbol* in the menu dialog box.

➔   Note: Waypoints that are used in an active route will not be deleted.

## Routes

A route is a series waypoints arranged in the order that you want to navigate them.

The route can be created from the Route's panel described below:.

### Creating a new Route

1.  Press the **MENU** key to bring up the quick menu
2.  Scroll to "Wpt/Rte/Trk..." and press the **ENT** key
3.  Press the **PAGE** key to select the Routes tab
4.  Press the **MENU** key to bring up the dialog box. This step will allow you to edit, make new route, delete all or find a route
5.  Select New, and highlight create using route list option, press **ENT** key
6.  Turn the rotary knob to highlight new route field
7.  Use virtual keypad to type in the route name if necessary. Press rotary knob to enable/disable display option
8.  Display will go to the PLOT screen showing your present position and the route point
9.  Highlight the **Save** button and press the **ENT** key (or highlight the **Cancel** button if you want to cancel the entry).
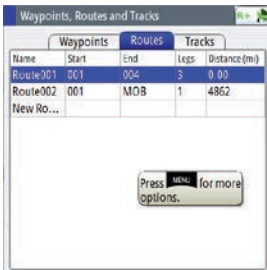
### Adding Waypoint(s) to a Route

Waypoint(s) can be added to an existing route by using the procedure below: .

1.  Press the **MENU** key to bring up the quick menu
2.  Highlight the Wpt,/Rte/Trk... menu
3.  Press the **ENT** key
4.  Press the **PAGE** key to tab to Routes
5.  Highlight the route you wish to modify
6.  Press the **ENT** key
7.  Using the rotary knob, move the highlight to the route table
8.  Press the **ENT** key
9.  Scroll down to the waypoint number where you want to add
10. Press the **MENU** key
11. Scroll to "Insert..." then press the **ENT** key
12. Select the waypoint number you wish to add from the waypoint bank or make a new waypoint
13. Press the **ENT** key
14. Press the **CLR** key to go out of the table
15. Highlight the **SAVE** button then press the **ENT** key
16. Press any hot keys to exit.
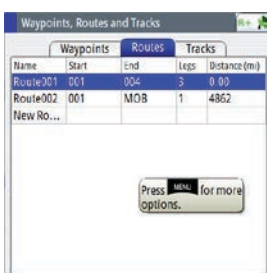
### To find a Route

1.  In the Wpts, Tracks and Routes table, press the **PAGE** key to highlight Routes tab
2.  Press the **MENU** key, on the menu list, scroll to *Find*, press the **ENT** key
3.  In Find from Vessel-Route window, highlight name field, press rotary knob. Use virtual keypad to enter name of route required
4.  Highlight the **Enter** button on keypad, press rotary knob. The result of the search will appear in table below
5.  Highlight the route desired, then press the **MENU** key to edit or start the route.

### Starting a Route

1.  Press the **MENU** key to bring up the quick menu
2.  Scroll to Wpt/Rte/Trk... and press the **ENT** key
3.  Press the **PAGE** key to tab to Tools
4.  Scroll to Waypoints, routes and tracks icon, then press the **ENT** key
5.  Press the **PAGE** key to select the Routes tab
6.  Press the **MENU** key
7.  Select New, and highlight create using route list option, press **ENT**
8.  The Route table will show route name's details. Use rotary knob to highlight the table, press rotary knob
9.  Scroll and select a route, press **ENT** key
10. In Edit Route window, the route details will be displayed (legs, waypoint,distance and bearing)
11. Turn the rotary knob to highlight the **START** button, press **ENT**
12. Select forward or reverse then press **ENT.**

Or, use the quick menu

1.  In main screen, press **MENU** key to bring up the quick menu
2.  Scroll to Goto...Press **ENT** key
3.  In submenu, choose Route
4.  On Select Route menu, scroll to required route, press **ENT** key
5.  The Start Route message will be prompted, forward, reverse or cancel route. Highlight action and press rotary knob.

## Tracks

A track is a graphical presentation of the historical path of the vessel, allowing you to retrace where you have travelled.

From the factory, the system is set to automatically draw a track. The system will continue to record the track until the track length reaches the maximum trail point setting, and will then automatically begin overwriting the oldest track points.

The automatic tracking function can be turned off from the Tracks panel described later in this section.

### Creating a new track

You define the track settings and start the new track from the Tracks Settings dialog described below.

### Track settings

The track is made up of a series of track points connected by line segments whose length depends on the frequency of track recording.

You can select to position track points based on time settings, distance, or by letting the GN70 system position a waypoint automatically when a course change is registered.

➔ Note: The Tracks option must also be turned ON in the chart settings to be visible.
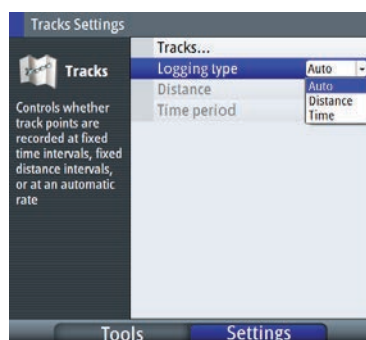
### Track setup

Use the procedure below to configure the track feature:

1. Press the **MENU** key
2. Scroll to Tracks, press the **ENT** key
3. Turn the knob to highlight the Logging type then press the knob
4. Select Auto, Distance or Time, press the **ENT** key
5. If selection is the Distance, to change follow instruction below
   - Highlight Distance, press **ENT** key
   - On virtual keypad, enter numeric value for distance period. Use the arrows to navigate the keypad. Range 000 to 115.07
6. If selection is the Time, to change follow instruction below
   - Highlight Time, press **ENT** key
   - Choose time interval (secs/mins) from menu list, turn rotary knob clockwise, highlight and press rotary knob
7. Press **CLR** key to escape.

### To edit Track

Use to change track log

1. Press the **MENU** key
2. Scroll to Wpt/Rte/Trk
3. Press the **ENT** key
4. Press the **PAGE** key to change the tab to Tracks
5. Scroll to the desired tracks
6. Press **MENU** key
7. In submenu, choose *Edit* option then press the **ENT** key
8. In Edit Track window, rotate knob and highlight  fields to change
9. To change track name, highlight the name field, press rotary knob, use virtual keypad to enter name
10. Highlight the **Enter** button in keypad when completed, then press the **ENT** key
11. To (remove) display or record track, (un)check the selection
12. Customize track display, rotate knob to graphic and press rotary knob, from grid select color of track
13. Enter description of track, press **ENT** key, use virtual keypad to enter alphanumeric details. Use **Enter** button to exit
14. Highlight Create Route to activate track
15. Highlight the **START** button then press the **ENT** key to start the route
16. Select going forward or reverse, then press the **ENT** key
17. At bottom of window, select to delete, show, save or cancel modification.

➔ *Note:* **Show** button will display the plot screen.
To toggle, press **ENT** key in the Edit Track window.

### To add new Track

1. Press the **MENU** key
2. Highlight the Wpt/Rte/trk, then press the **ENT** keyl
3. Press **PAGE** key, to Tracks tab, see list of tracks
4. Rotate knob to highlight track line identified as New Track, press **ENT** key (or for same function, press **MENU** key, scroll to New)
5. In New Track window, highlight field, press rotary knob, use virtual keypad to enter name
6. Press **Enter** button in keypad when completed
7. To (remove) display or record track, (un)check the selection
8. Customize track display, rotate knob to graphic and press rotary knob, from grid select

color of track

9. Enter description of track, press **ENT** key, use virtual keypad to enter alphanumeric details. Use **Enter** button to exit

10. At bottom of window, select to save or cancel entry

11. Press **CLR** key to exit.

### To find a Track

1. Press the **MENU** key

1. Highlight the Wpt/Rte/Trk and press the **ENT** key

2. Press **PAGE** key, to Tracks tab, see list of tracks

3. Press the **MENU** key

4. In submenu, choose Find option, press **ENT** key

5. Find from Vessel- Track window, select a track from list below

6. Press **MENU** key, scroll to Show option, press **ENT** key.

The selected track will be displayed in the plot screen.
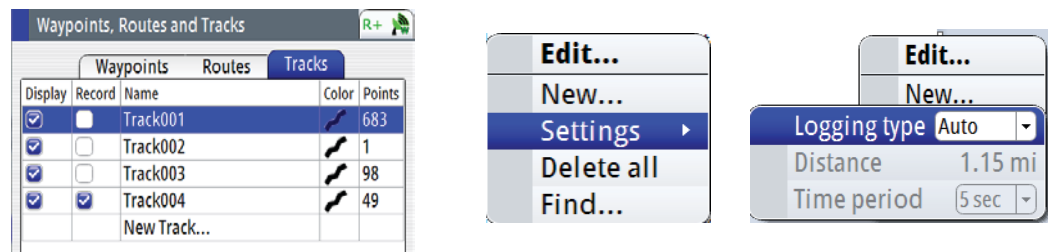
# 7

# Navigating with the GN70

The navigation function allows you to navigate towards a waypoint, along a predefined route or a new Lat/Long coordinate.

## The Goto Menu

You can start navigation to any waypoint or route from the NAV screen by using the Goto menu, displayed by pressing **MENU** key.

➔  *Note:* When the GN70 starts navigating, the cross track limits will be indicated on the NAV screen.

### Navigate a Route

Start navigating a route by pressing the **NAV** key, then pressing the **MENU** key and then activating the Goto menu and scroll to Route.
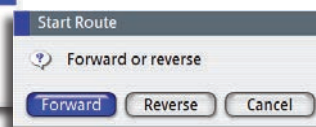
When route navigation is started, the Goto menu will expand showing options for skipping a waypoint, or for restarting the route from current vessel position.
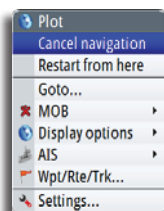
### Cancel Navigation

You can cancel navigation from the Goto menu. Press the **MENU** key one time to bring up the quick menu. Select the Cancel navigation and press the **ENT** key.

## Navigation Settings Panel
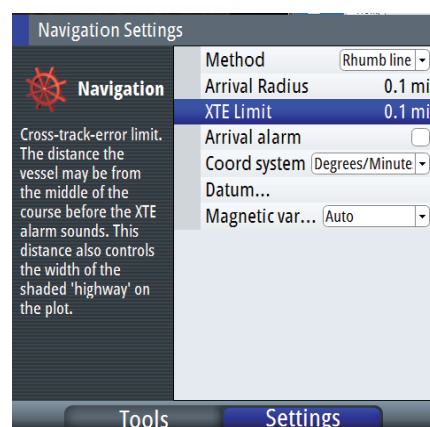


### Navigation Method

Different methods are available for calculating the distance and bearing between any two points on a chart.

The Great Circle (GC) route is the shortest path between two points. However, if you are to travel along such a route, it would be difficult to steer manually as the heading would constantly be changing (except in the case of due north, south, or along the equator).

Rhumb lines (RL) are tracks of constant bearing. It is possible to travel between two locations using Rhumb line computation, but the distance would usually be greater than if Great Circle is used.

### Steering Alarm Limits

**Arrival Radius**

Sets an invisible circle around the destination waypoint.

The vessel is considered to have arrived at the waypoint when it is within this radius.

**Off Course (XTE) Limit**

This parameter defines the vessel's accepted offset distance from the leg. If the vessel goes beyond this limit an alarm will be activated.

**Arrival Alarm**

When the arrival alarm is enabled, an alarm will be activated as the vessel reaches the waypoint or when it is within the specified arrival radius.
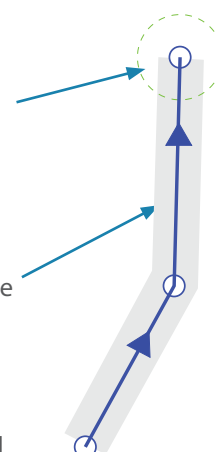
### Magnetic Variation

Magnetic variation is the difference between true bearings and magnetic bearings, caused by different location of the Geographic and the Magnetic north poles. Any local anomalies such as iron deposits might also affect the magnetic bearings.

Magnetic variation is applied in order to navigate with heading in "True" mode.

When set to Auto, the system automatically converts magnetic north to true north. Select manual mode if you need to enter your own local magnetic variation.

### Datum

Most paper charts are made in the WGS84 format, which also is used by the GN70 system.

If your paper charts are in a different format, you can change the datum setting accordingly to match your paper chart.

### Coordinate System

Several coordinate systems can be used to control the format for Lat/Long coordinates displayed on the POS and PLOT panels.

## Navigation Panels

The Steer and Position panels are used to display information when you are navigating.

### The NAV Panel



Status Bar

Heading

263

Destination WPT#

003

DTD  mi  BTW  °M  TTD  hrs
4.20  263  0:05:02

NAV Data

SOG  mph  COG  °M  ETA
50.0  263  10:09:47 am

0.75mi  0.75mi

Vessel    Course Line    Cross-Track Limit
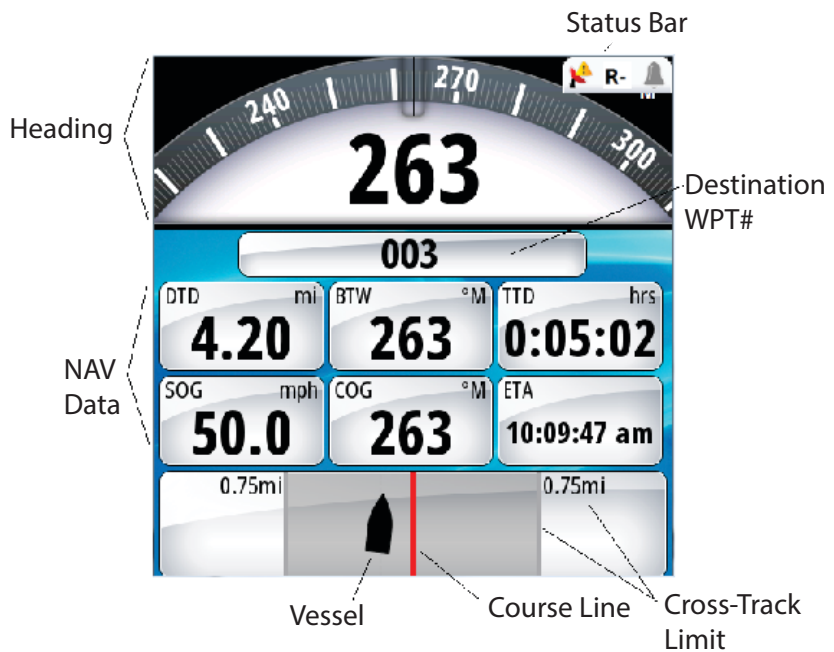
**Data Fields**

The NAV/Steer panel offers the following information:

Heading    True or magnetic compass heading

Status Bar    Shows condition of GPS, RAIM and alarm

WPT#/Name  Destination waypoint identification

DTD           Distance to destination

BTW           Bearing to waypoint

SOG           Speed over ground

COG           Course over ground

TTD           Time to destination

ETA           Estimated time of arrival at next waypoint

STEER        Course to steer towards next waypoint

**The Course Line**

When travelling on a route the course line shows the intended course from one waypoint towards the next.

When navigating towards a waypoint (MOB or an entered Lat/Long position), the course line will show the intended course from the point at which navigation was started towards the next waypoint.

**Vessel Symbol**

The vessel symbol indicates distance and bearing relative to the intended course.

**Off course Limit**

If the XTE exceeds the defined off course limit, this will be indicated with a red arrow including the distance from the track line.

If the off course alarm is enabled, and the XTE exceeds the defined off course limit., the alarm will activate.

## The POSition Panel

The POS screen provides the largest presentation of the present position Lat/L ong coordinates. It also display the course-over-ground (COG) and speed-over-ground (SOG) and the UTC Date & time. The time can be configured for local 24-hour or AM-PM setting.



GPS position info



SOG/COG with source name indicated

### Data Fields

Heading       True or Magnetic compass heading

Status Bar    Indicates status of GPS, RAIM and alarm

GPS           Position in Lat. and Long. (other coordinate format is available)

Time          UTC or Local

Date          MM/DD/YYYY

SOG           Speed over ground (Knots)

COG           Course over ground (True or Magnetic)

➔ *Note:* The COG/SOG field will indicate the source of data if you assign a 5-character alphanumeric name to the device used for positioning and heading (i.e. SOG xxxxx Kn and COG xxxxx M) (see above picture).

The GN70 can display the Lat/Long data in several coordinate formats. To change the L/L format:

1. Press the **MENU** key to bring up the quick menu
2. Scroll down to Tools and Settings and press the **ENT** key
3. Scroll to NAVIGATION and press the **ENT** key
4. Scroll to Coord System (the default setting is Degrees-Minutes)
5. Press the **ENT** key to bring up the different selections
6. Scroll to the desired L/L format
7. Press the **ENT** key to confirm selection
8. Press the **POS** hot key to verify.
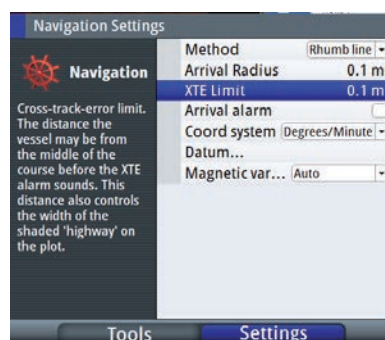
# 8 HDG Screens

There are two heading (HDG1 and HDG2) screens. The HDG1 screen displays the analog compass rose with the digital heading readout in the center, while the HDG2 screen displays the digital HDG, ROT, Pitch, ROLL and YAW information. The HDG data is only valid if a GPS compass antenna or an alternative source of heading is available via the N2K network.  You can toggle between the HDG1 and HDG2 screens by pressing the HDG hot key once or twice.



*HDG1 screen*



*HDG2 screen*

## Quick Menu

| Quick Menu | Description |
| --- | --- |
| Data source | Allows you to select the source of position and heading data to be used for navigation and display. |
| Goto | Lets you navigate to a waypoint, route or coordinate. |
| Wpt/Rte/Trk | Shortcut to the Tools=>Wpt/Rte/Trk menu. |
| Tools and Settings | Will bring up the main menu page. |

## Data Source Selection

There are two methods for data source selection; auto or manual. In *Auto Select* mode, the source of compass data is selected based on the availability of the heading data in the N2K network. The *Auto Select* mode assures you that the GN70 will pick the best possible source of data for all features listed in the sub-menu below. Should there be a need to override this auto feature, the operator can manually change the individual selection using the procedure below.
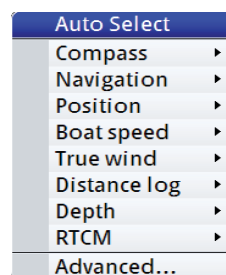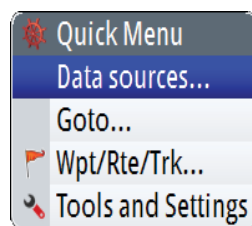




Manual Selection procedure:

1. Press the **MENU** key
2. The highlight the Data sources... menu
3. Press the **ENT** key
4. Highlight Compass, then press the **ENT** key
5. Press the **ENT** key to change the group (if none is selected) to SIMRAD -for all SIMRAD products
6. Highlight the desired source then press the **ENT** key
7. Repeat the process for Navigation, Position, Boat speed, and others when necessary
8. When selection is completed, press the **CLR** key or any hot key (NAV, POS, etc.) to exit.

## Advance Data Source Selection

Selecting the "Advance..." setting will bring up the list of data sources that is detected in the N2K network. Manual selection can be done by scrolling to the desired source and pressing the **ENT** key to leave a check mark. You can exit at anytime when the selection is completed by pressing any one of the hot keys.
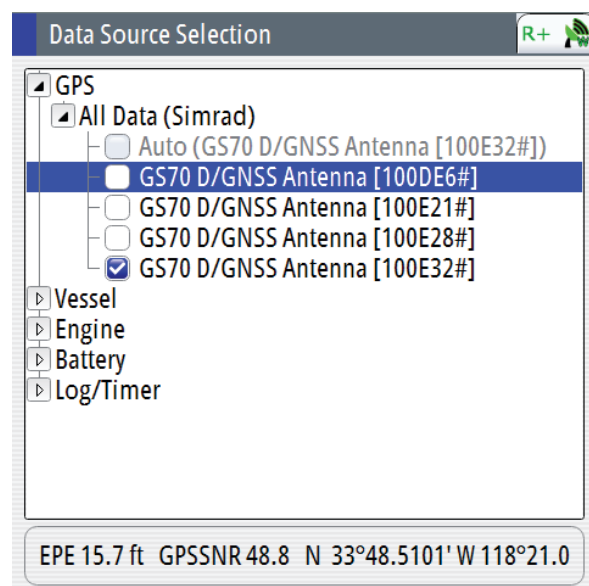


## Heading reference control

The heading reference can be changed to TRUE or MAGNETIC using the procedure below:

1. Press the **MENU** key
2. Scroll to Tools and Settings and then press the **ENT** key
3. Scroll to UNITS icon and then press the **ENT** key
4. Scroll down to Heading and then press the **ENT** key
5. Toggle to T (True) or M (Magnetic) and then press **ENT** key to accept
6. Press any hot key to exit.

# 9

## Using AIS (PLOT)

If a SIMRAD AIS transponder or DSC transceiver device is connected to the NMEA 2000 network, the GN70 can display the AIS target information in the AIS page. You can also see messages and position for DSC transmitting devices within range. If none is available, the plotter screen can show the waypoints, routes and tracks. You can zoom out by turning the rotary knob counter-clockwise and zoom in by turning it in clockwise direction. AIS targets can be displayed as overlay on the plotter screen. This feature is an important tool for safe travelling and collision avoidance.

You can define alarms to notify you if an AIS target gets too close or if the target is lost.



AIS vessels on AIS/PLOT screen
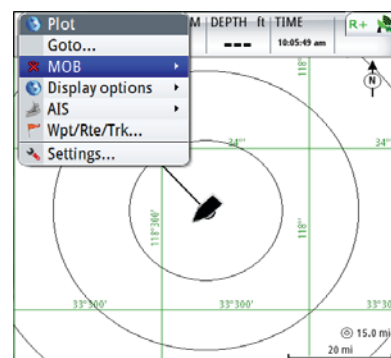


AIS Plot with Quick Menu

## Target symbols

The GN70 system use the AIS target symbols shown below:

| Symbol | Description | |
|---|---|---|
| | Sleeping AIS target (not moving or at anchor) | |
| | Moving and safe AIS target with course extension line. | |
| | Dangerous AIS target, illustrated with bold line. | A target is defined as dangerous based on the CPA and TCPA settings. Refer to "Defining dangerous vessels" on page 45. |
| | Lost AIS target. | When no signals have been received within a time limit a target will be defined as lost. The target symbol represents the last valid position of the target before the reception of data was lost. |

## Viewing information about AIS targets

### AIS target list

The list of AIS targets can be displayed by using the procedure below:

1. Press the **AIS** hot key
2. Press the **MENU** key to bring up the quick menu
3. Using the rotary knob, scroll to Settings
4. Press **ENT**
5. Press the **PAGE** key
6. Scroll to AIS
7. Press **ENT** again to show the list
8. To exit, press the **CLR** a few times or any hot key.

### Selecting AIS target

**Viewing information about all AIS targets**

Detailed information about an AIS target can be accessed by using the previous procedure (steps 1-7) and:

1. Using the rotary knob, scroll to the desired AIS target
2. Press the **ENT** key to show the details of the target vessel
3. Press any hot key to exit.

## Vessel alarms

You can define several alarms to alert you if a target comes within predefined range limits, or if a target is lost.

| Alarm ID | Description |
|---|---|
| Dangerous vessel | Controls whether an alarm shall be activated when a vessel comes within the predefined CPA or TCPA. See "Defining dangerous vessels" on page 45.<br><br>➔ *Note:* The check box controls whether the alarm pop-up box is displayed and if the siren will sound. The CPA and TCPA defines when a vessel is dangerous regardless of the enabled/disabled state. |
| AIS vessel lost | Sets the range for lost vessels. If a vessel is lost within this range this will trigger an alarm |
| Vessel message | Controls whether an alarm shall be activated when a message is received from an AIS target |

# The vessel settings panel
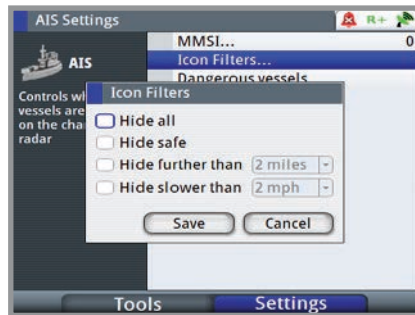


## Your vessel's MMSI number

You need to have your own MMSI (Maritime Mobile Service Identity) number entered in the GN70 system to be able to receive addressed messages from AIS and DSC vessels.

It is also important to have the MMSI number entered to avoid seeing your own vessel as an AIS target on the plotter.

➔ *Note:* The Vessel message option in the alarm settings must be toggled on if any MMSI message shall be displayed.

## Filtering the targets

All targets are by default shown on the display if an AIS device is connected to the N2K network.

You can select not to show any targets, or to filter the icons based on security settings, distance and vessel speed.
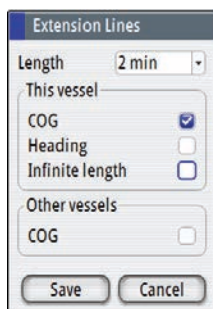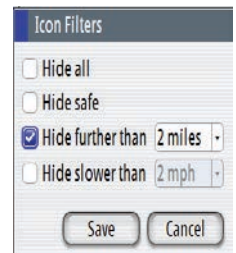


## The vessels extension lines

The length of the extension lines for your vessel and for other vessels can be set by the operator.

The length of the extension lines is either set as a fixed distance, or to indicate the distance the vessel will move to in the selected time period.

For your vessel, heading information is read from active heading sensor, and COG information is received from the active GPS.

For other vessels COG data is included in the message received from the AIS system.
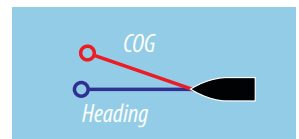




## Defining dangerous vessels

You can define an invisible guard zone around your vessel. When a target comes within this distance from your vessel, the symbol will change to the "dangerous" target symbol. An alarm will be triggered if activated in the Alarm settings panel.
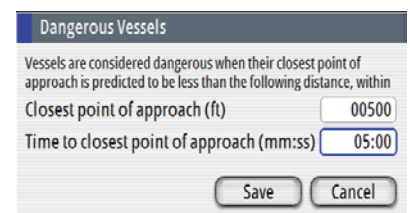


## Speed and Course indication

The extension line can be used to indicate speed and course for targets; either as absolute (true) motion in the chart or relative to your vessel.

Different line style is used on the extension lines to indicate motion as shown below.
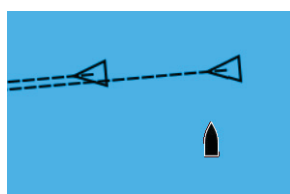


*Absolute motion*
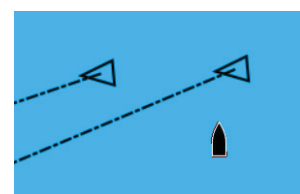


*Relative motion*

# 10

# The Alarm system

The GN70 system continuously checks for dangerous situations and system faults while the system is running. When an alarm situation occurs, an alarm message will pop up on the screen and the status indicator on the top-right corner of the display will show the alarm bell icon.

If you have enabled the siren, the alarm message will be followed by an audible alarm, and the external alarm output will be active.

The alarm is recorded in the alarm listing so that you can see the details and take the appropriate corrective action.

## Type of messages

There are two type of messages:

- Alarms
    - Generated when conditions are detected that critically effect the capability or performance of the system.
      You must critically examine all alarm messages to determine their course and effect.
- Warnings
    - Informing you of conditions that could result in unwanted system response or eventual failure.

The messages are classified according to how the reported situation will affect your vessel. The following icon color codes are used:

| Color | Importance |
|---|---|
| Red | Critical |
| Orange | Important |
| Yellow | Standard |
| Blue | Warning |
| Green | Light warning |

### Single alarms

A single alarm is displayed with the name of the alarm as the title, and with details for the alarm.
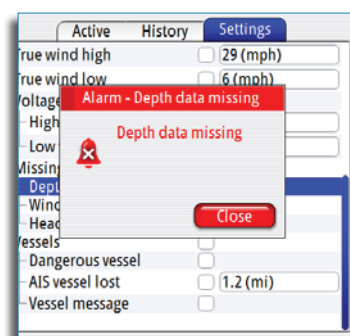
### Multiple alarms

If more than one alarm is activated simultaneous-ly, the alarm message will display a list of up to 3 alarms. The alarms are listed in the order they occur with the alarm activated first at the top. The remaining alarms are available in the Alarms dialog.
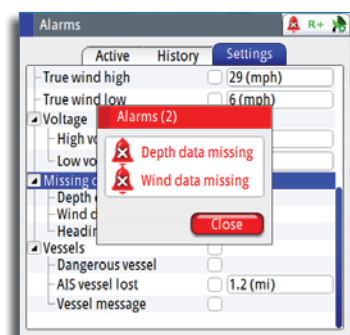
## Acknowledging a message

The following options are available in the alarm dialog for acknowledging a message:

| Option | Result |
|---|---|
| Close (or OK) | Sets the alarm state to acknowledged, meaning that you are aware of the alarm condition. The siren / buzzer will stop and the alarm dialog will be removed. |
| | The alarm will however remain active in the alarm listing until the reason for the alarm has been removed. |
| Disable | Disables the current alarm setting. The alarm will not show again unless you turn it back on in the Alarms dialog. |

There is no time-out on the alarm message or siren. These remain until you acknowledge it by pressing the **ENT** key or the center of the rotary knob or until the reason for the alarm is removed.

## The alarms dialog

The alarms can be setup in the Alarms dialog. This dialog also includes information about active alarms and alarm history.

### Alarm Settings

To setup the alarm limits, press the **PAGE** key to change the tab to Settings. Use the rotary knob to scroll up or down through the different alarm settings and press the **ENT** key to affix the check mark and specify limit values.
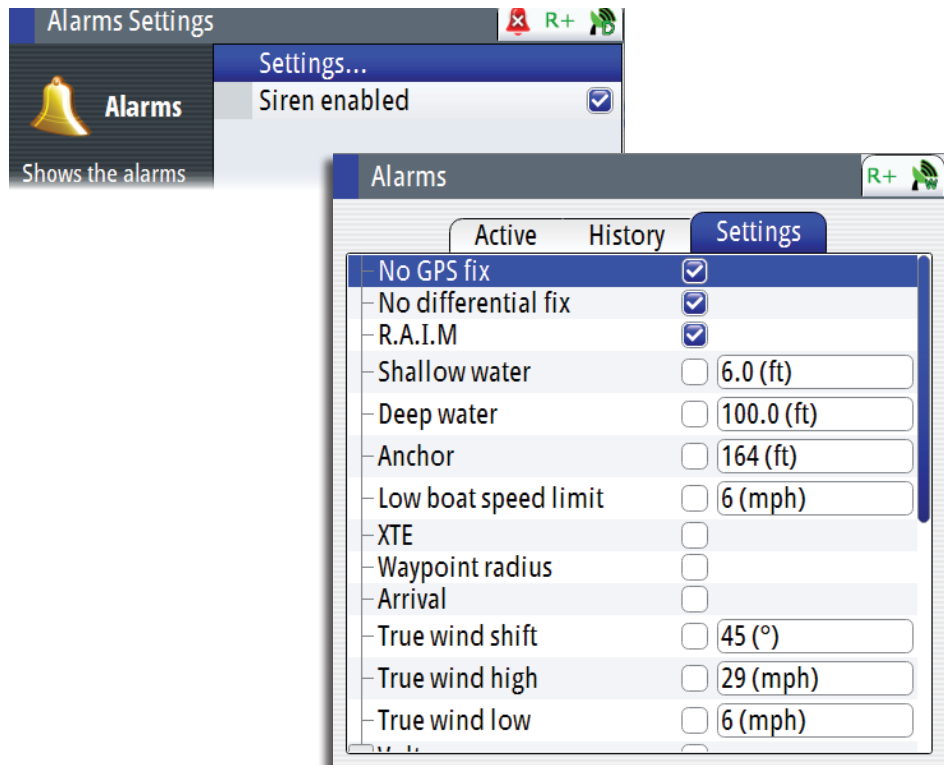
**List of alarm messages**

| Alarm name | Trigger Condition |
|---|---|
| No GPS Fix | No position fix available from the smart antenna |
| No differential fix | No differential correction is available. GPS position fix only |
| RAIM (R- or R?) (Receiver Autonomous Integrity Monitoring) | The position solution exceeded 100 meter error (R-) or when not enough satellites available (R?). RAIM safe condition is indicated with R+. |
| Shallow water | Depth less than limit |
| Deep water | Depth greater than limit |
| Anchor | Vessel drifts away from the anchor radius |
| Low boat speed limit | Boat speed below the limit |
| XTE (Cross Track Error) | Vessel drifts out of the crosstrack zone |
| Waypoint radius | Vessel enters the radius of the waypoint |
| Arrival | Vessel arrives at waypoint |
| High voltage | Input voltage above the limit |
| Low voltage | Input voltage below the limit |
| Depth data missing | No heading data from data source |
| Heading missing | No heading data from data source |
| Dangerous vessel | AIS target within the limit |
| AIS vessel lost | AIS target is outside of limit |
| Vessel message | Received an AIS message |

# 11

# Using the simulator

## Simulator mode

The simulation feature will let you see how the unit works in a stationary position and without being connected to the GPS antenna.

You can use the simulator to help you become familiar with your unit before using it out on the water.

When the simulator is toggled on, this is indicated in the lower part of the display.

Simulating

### Advanced simulator settings

The advanced simulator settings allow you to define how to run the simulator. When the settings are saved, these will be used as default when starting the simulator mode.

#### GPS source

Selects where the GPS data is generated from. The selections are: Simulated course or Simulated route (default).

#### Speed, course and route

Used to manually enter values when GPS source is set to Simulated course or Simulated route.

#### Set start position

Moves the vessel to current Lat/Long position.
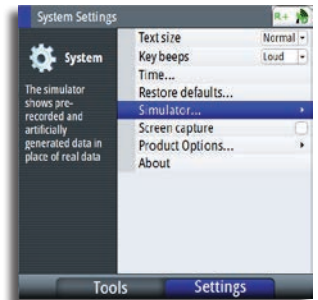
> ⚠ **Warning:** Do not use the GN70 for navigation when in Simulator mode.

## Simulation setup

To activate the simulator, do the following:

1. Press the **MENU** key
2. Scroll to Tools and Settings then press the **ENT** key
3. Scroll to System icon then press the **ENT** key
4. Scroll down to Simulator, then press the **ENT** key
5. Scroll to Simulator Settings then press the **ENT** key. This will bring up the advanced simulator settings dialog box
6. Select Simulated course (default) setting
7. Scroll down to Speed (Kn) and press the **ENT** key. Enter the desired speed in knots using the numeric keypad
8. Scroll to **OK** button, then press the **ENT** key to confirm your entry
9. Scroll to Heading then press the **ENT** key
10. Enter the heading in degrees using the numeric keypad. Press the **ENT** key
11. Highlight the **OK** button and then press the **ENT** key
12. Scroll down to Start Position field then press the **ENT** key
13. Using the numeric keypad, enter the Lat/Lon coordinates where you want to start the navigation
14. Press the **ENT** key after the last digit is entered
15. Highlight **SAVE** button then press the ENT key
16. Press the **NAV** key to exit and verify the displayed Lat/Long
17. Using the simulator mode, you can create waypoints, routes and calculate range and bearing that location.
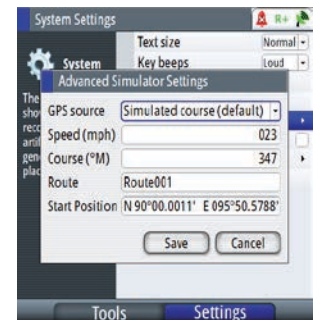
# 12 Maintenance

## Preventive maintenance

The GN70 display and antenna unit does not contain any field serviceable components, therefore the operator is required to perform only a very limited amount of preventative maintenance.

It is recommended that you use an optional protective sun cover when the display unit is not in use.

## Simple maintenance procedures

### Cleaning the display unit

The supplied cleaning cloth should be used to clean the screen, where possible. Use plenty of water to resolve and take away salt remains. Crystalized salt may scratch the coating if using a damp cloth. Apply minimal pressure to the screen.

Where marks on the screen can't be removed by the cloth alone, use a 50/50 mixture of warm water and isopropyl alcohol to clean the screen. Avoid any contact with solvents (acetone, mineral turpentine etc.), or ammonia based cleaning products, as they may damage the anti-glare layer, plastics bezel, or rubber keys.

To prevent UV damage to the plastic bezel and rubber keys, it is recommended that sun cover be fitted when the unit is not in use for an extended period.

### Checking the keys

Make sure that no keys are stuck in the down position. If one is stuck, wiggle the key to free it back to normal.

### Checking the connectors

The connectors should be checked by visual inspection only.

Push the connector plugs into the connector, if the connector plugs are equipped with a lock; ensure that this is in the correct position.

## Trouble shooting

| Failure | Corrective action |
|---|---|
| Unit fails to turn ON | Make sure the power cable is plugged in to the back of the GN70 and the 12-24 VDC power is turned ON. The unit normally takes about 30 seconds to re-boot when power connection is removed and re-connected. |
| | Check the in-line fuse (or circuit-breaker) of the power cable. Replace the fuse when blown. |
| | Using a voltmeter, verify that the 12-24 VDC supply is present on the power cable connector pins. |
| | If problem persist, replace the GN70 unit. |
| Unit fails to detect the antenna | Make sure the GS70 (or any N2K GPS sensor) antenna is connected properly and the cable connector is good.  Check for any damage to the cable. |
| | Verify if the dedicated 12 VDC supply to the N2K network is available. Re-cycle the power to the N2K bus. |
| | Verify if the antenna is selected as the source of data under the main Menu/Network page. |
| | Make sure N2K terminators are used on both ends of the NMEA 2000 bus. |
| | If problem persist, replace the antenna unit. |

| True Heading is not displayed | Verify if the source of data is the GS25, HS70/HS80/MX575C or Gyro. Perform an auto select procedure or manually select the proper GPS compass unit. If problem persist, replace the GPS compass antenna unit. |
|---|---|
| AIS targets are not detected | Verify if an AIS transponder is connected in the N2K bus. |
| | Make sure the AIS transponder is ON. |
| | Check the VHF antenna, coaxial cable and connector(s) for any damage. |
| | If problem persist, replace the AIS transponder. |
| Dim display | Press the power button momentarily to increase the backlight brightness. |
| Red flashing power button, black display | Local supply voltage missing or <5 V. Check local supply, connections and fuses. |
| CAN bus failure | Poor CAN bus backbone, defective cable/connector or defective CAN bus receiver in autopilot control unit. 1. Check backbone terminations 2. Check cable and connectors 3. Replace Autopilot control unit. |
| Low CAN bus voltage | Check cable length, bus load and bus supply feeding point. If possible, check if fault disappears by disconnecting some units. |

# Software upgrades

The latest software for the GN70 will be available for download from our web site;
pro.simrad-yaching.com

Software upgrade can be done by connecting a Windows PC running Windows XP (or newer) operating system via the LAN port or via the NMEA 2000 network.

### Software Update Procedure using the LAN connection

1. Copy the *.upd file to your PC (not a network location)
2. Connect the GN70 directly to your computer with a network cable
3. Press and hold down the **PAGE** button (top left button above the rotary) and apply external power to the unit
4. Launch the Internet Explorer (or other web browser) and type the address as shown on the GN70 (i.e. http://192.168.0.1)
5. Browse to the file on your PC
6. Click on upload.
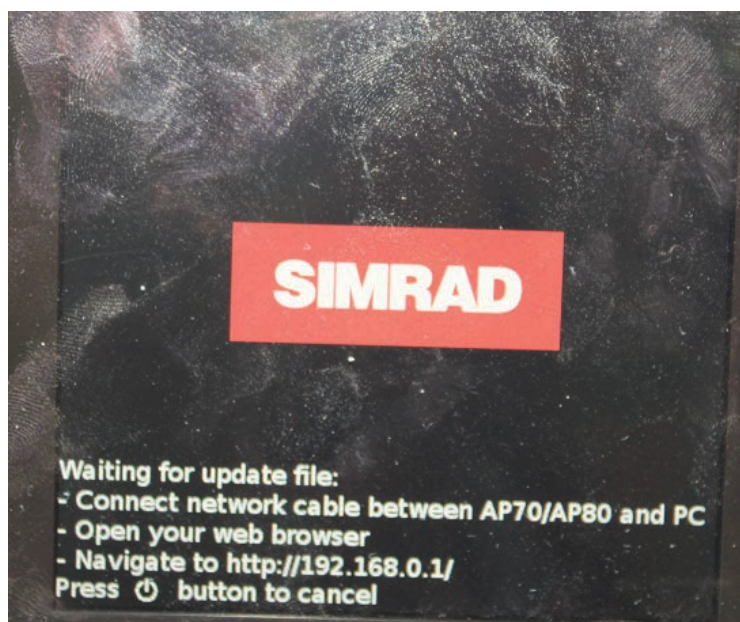


### Programming via the NMEA 2000 network

This can only be done when you have a CAN to USB converter (P/N 000-00020-001).

# 13 List of components

The tables below list parts that are included in your GN70 kit as well as optional items such as, cables and accessories that are available from your dealers.

## GN70 standard parts list

| Part Name | Qty | Part number |
|---|---|---|
| GN70 Display Unit | 1 | 000-10913-001 |
| Operator and Installation Manual | 1 | 988-10370-001 |
| Quick Guide | 1 | 988-10369-001 |
| Power Cable Assembly | 1 | 032-0055-88 |
| Mounting Template | 1 | 988-10201-001 |
| Mounting kit | 1 bag | 003-8721-00 |
| Mounting gasket | 1 | 074-1114-000 |
| Cable Assy, 6 m N2K Ext-BLK | 1 | 003-8634-00 |
| Micro-C, T-Connector | 1 | 000-10404-001 |

## NMEA 2000 (N2K) smart antenna models (choose one)

| Part Name | Part number | Remarks |
|---|---|---|
| GS70 Smart Antenna | 000-11137-001 | Standard GPS antenna |
| HS80 GPS compass with N2K adapter | 000-10938-001 | Option (HDG & POS) |

## NMEA 0183 smart antenna models (optional)

| Part Name | Part number | Remarks |
|---|---|---|
| MX521A DGPS Antenna | 727051 | GPS, Beacon & WAAS |
| MX521A GPS Antenna | 727050 | GPS & WAAS |
| MX575C DGPS Compass w/15m cable | 000-10747-001 | GPS, HDG, Beacon & WAAS |

➔ *Note:* The MX610JB junction box is required when using antenna models that use NMEA 0183 interface. The MX610JB is not weatherproof and must be mounted in a sheltered location.

## NMEA 2000 (N2K) cables and accessories (order separately)

| Part Name | Part number |
|---|---|
| CZONE, NMEA 2000 EXTENSION 0.5 m | 000-10816-001 |
| CZONE, NMEA 2000 EXTENSION 2.0 m | 000-10817-001 |
| CZONE, NMEA 2000 EXTENSION 5.0 m | 000-10814-001 |
| CZONE, NMEA 2000 EXTENSION 10 m | 000-10815-001 |

**Optional accessory items for N2K network**

| Part Name | Part number |
|---|---|
| Protective cover (White) | 000-10369-001 |
| Optional mounting kit | 000-10590-001 |
| MX610JB Smart junction box | 000-10425-001 |
| AT10 N2K to NMEA Converter | 24005936 |
| Cable, Micro-C, Metal, 0.4 m | 000-10396-001 |
| Cable, Micro-C, Metal, 2 m | 000-10397-001 |
| Micro-C, Metal, 5 m | 000-10398-001 Cable |
| Cable, Micro-C, Metal, 9 m | 000-10399-001 |
| Micro-C T-connector, Metal | 000-10403-001 |
| Micro-C, Field Connector | 000-10404-001 |
| N2K-PWR-RD - NMEA 2000® power cable | 000-0119-75 |
| NMEA2000 MicroTerminator, Metal, Female | 000-10462-001 |
| NMEA2000 MicroTerminator, Metal, Male | 000-10463-001 |
| CZONE, NMEA 2000 FEMALE RESISTOR | 000-10820-001 |
| CZONE, NMEA 2000 MALE RESISTOR | 000-10821-001 |

# 14

# Mounting

## General

The standard mounting of the GN70 display is in-dash or panel mount. If there is a need to bracket mount the unit, an optional U-bracket assembly can be ordered separately.

## Mounting location

The GN70 unit should be mounted with special regard to the unit's easy access for operation and maintenance, environmental protection, temperature range, cable connection and cable length.

Survey the front and back side of the instrument panel where the unit will be mounted before cutting the mounting hole to make sure there is ample room around the unit and no hidden electrical wires or other parts will be damaged behind the panel. The panel mounting surface must be flat and even to within 0.5 mm.

The GN70 conforms to the appropriate Electromagnetic Compatibility (EMC) standards, but proper installation is required to get best use and performance from this product. Ensure adequate separation from other on-board electronics and electrical equipment.

## GN70 control unit

Avoid mounting the GN70 control unit where it is easily exposed to sunlight, as this will shorten the lifetime of the display. If this is not possible, make sure the unit is always covered with the optional protective cover when not in use.

### Panel (flush) mount

1. Attach the mounting template to the selected mounting position
2. Drill pilot holes for the 4 hole saw cuts and for the 4 self tapping screws used to secure the unit. If using M4 machine screws use a 5 mm (0.20 ") drill bit
3. Use a 25 mm (1 ") hole saw to cut the four corner radius
4. Cut along the dotted line and remove waste material
5. Peel backing off the gasket and apply it to the unit (A)
6. Connect the cables to the rear of the unit before placing the unit into the console
7. Secure the display to the surface with 4 screws (B)
8. Firmly clip the bezel in place (C).
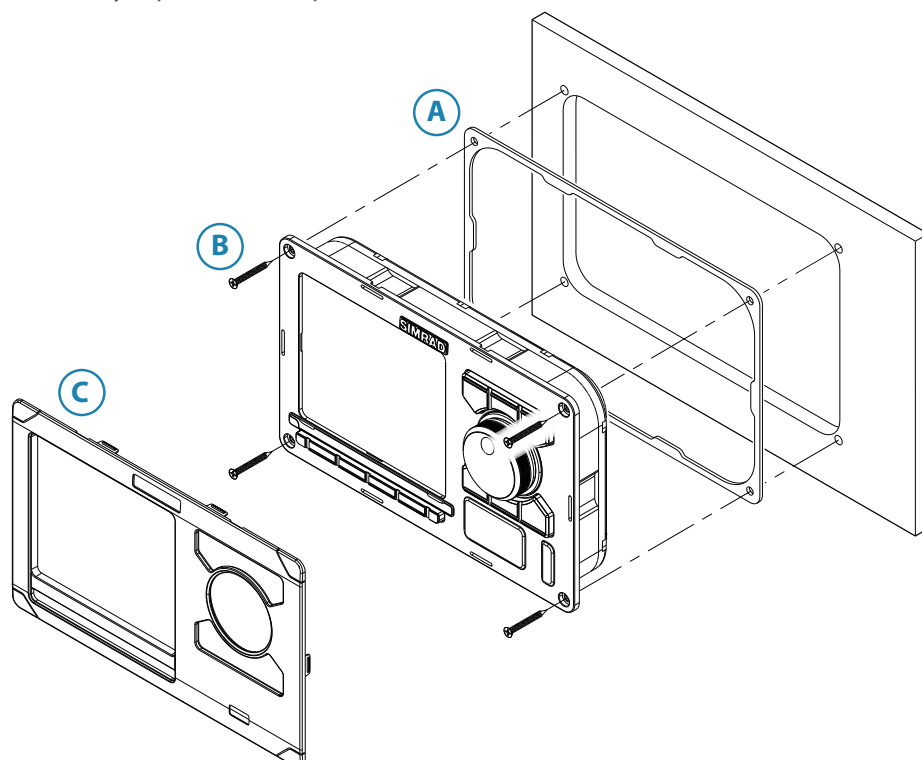
## Bracket mount (option)

→ *Note:* When the control unit is bracket-mounted, it is not completely weatherproof from the back due to a breathing hole in the back cabinet. When bracket-mounted, the exposed parts of the plugs should be protected against salt corrosion.

1. Use the bracket base as a template to mark the screw hole locations
2. Drill pilot holes and hole for cables if required
3. Secure the bracket base to the surface
4. Secure the bracket's adapter to the rear of the control unit using the 4 screws supplied with the bracket
5. Align the bracket base with the cradle and partially screw in the bracket knobs one at a time
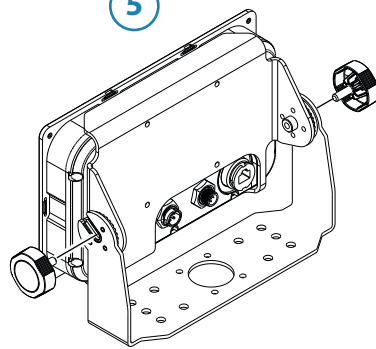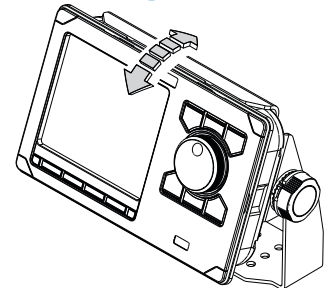6. Adjust the unit for best viewing angle, and tighten the bracket knobs.
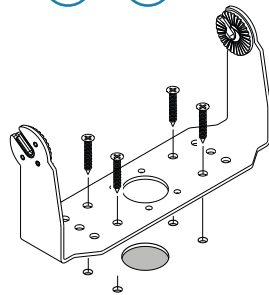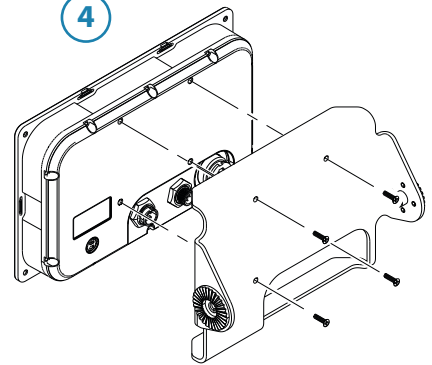
## GN70 antennas

Several IMO-compliant antenna models can be used with the GN70, namely:

* GS70 - GPS/WAAS smart antenna (N2K interface) - Standard
* HS80 or MX575C D/GPS compass unit (N2K or NMEA 0183 interface) - Option
* MX521A - GPS/DGPS smart antenna (NMEA 0183 interface) - Option

As a general rule, the antenna unit must be located in the open where it will have a good view of the sky aournd it. It must also be located away from large metal objects that can block the GPS signal as well as influence the operation of the antenna unit.

### Antenna mounting guidelines

* Install the antenna where it has a clear view of the sky around it
* Keep it away from large metal structures like the main mast or overhead railings
* Stay away from high-powered transmitter antennas like SSB, VHF and other radio transmitter antennas
* Mount the GPS antenna low to avoid excessive position and speed errors while underway
* Locate the antenna at least 10 meters away and below the transmitting beam of the radar and INMARSAT antennas.
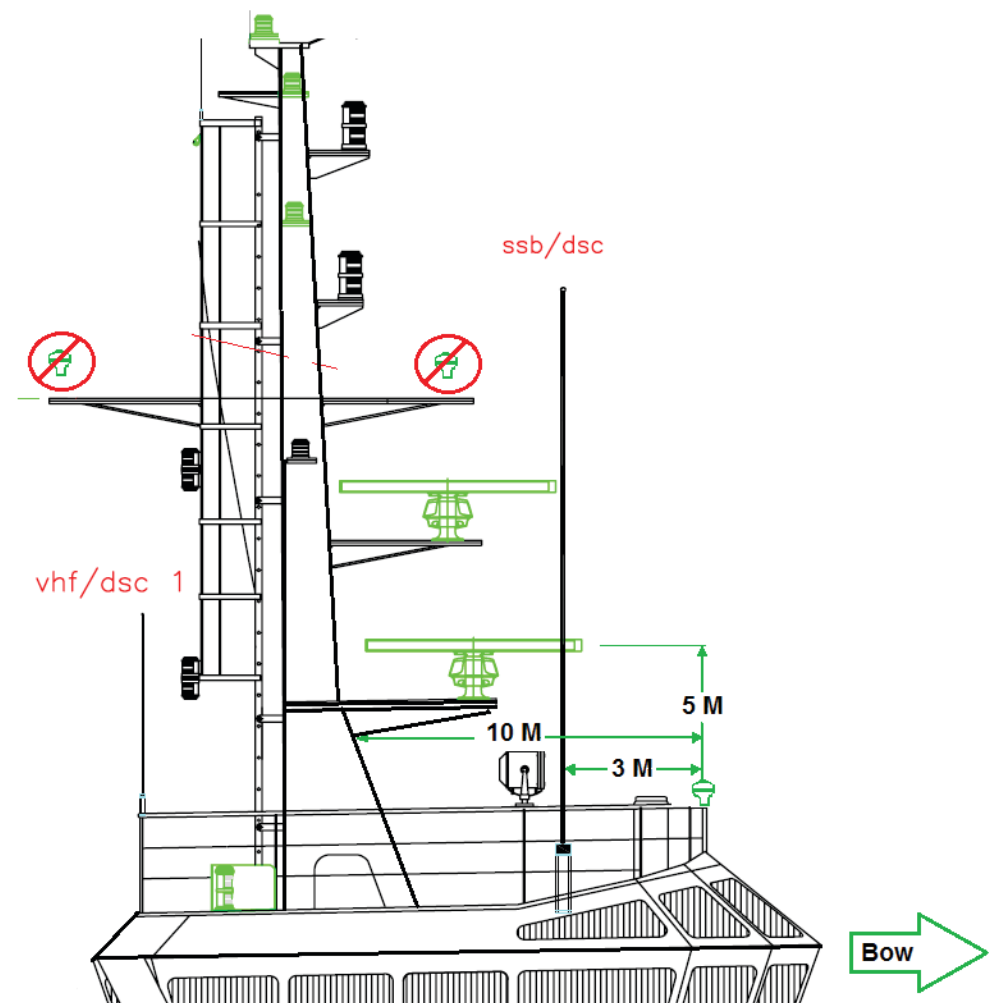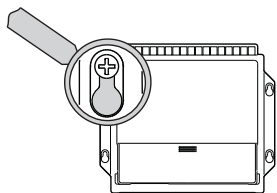
## MX610 JB junction box (option)

The mounting location must allow for required working area when connecting the cables. Also ensure that the location for the computer units allows viewing the board's LED indicators.

The mounting surface needs to be structurally strong, with as little vibration as possible. If possible, mount the unit close to the edges of a panel to minimize vibration.

Ensure that any holes cut are in a safe position and will not weaken the boat's structure. If in doubt, consult a qualified boat builder. Ensure that there are no hidden electrical wires or other parts behind the panel.

Preferably mount the junction box with the cable entries exiting downwards.

Mount the cable retainer included with the MX610 J-Box on the wall beneath the unit.

# GN70 display unit

54 mm
(2.13")

Min
65 mm
(2.56")

135 mm (5.31")

32 mm
(1.26")

144 mm (5.67")

220 mm
(8.66")

230 mm
(9.06")

POS  NAV  HDG  AIS

SIMRAD
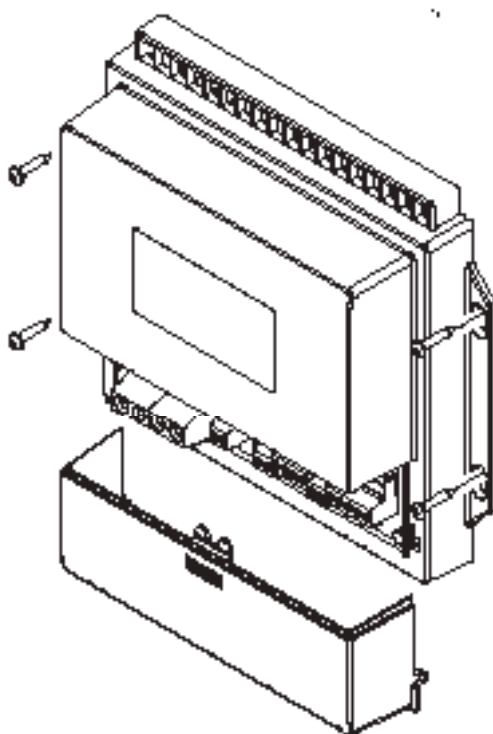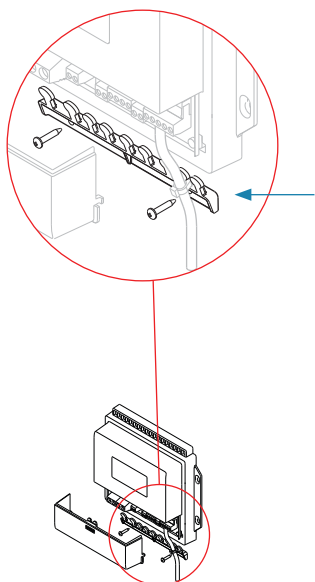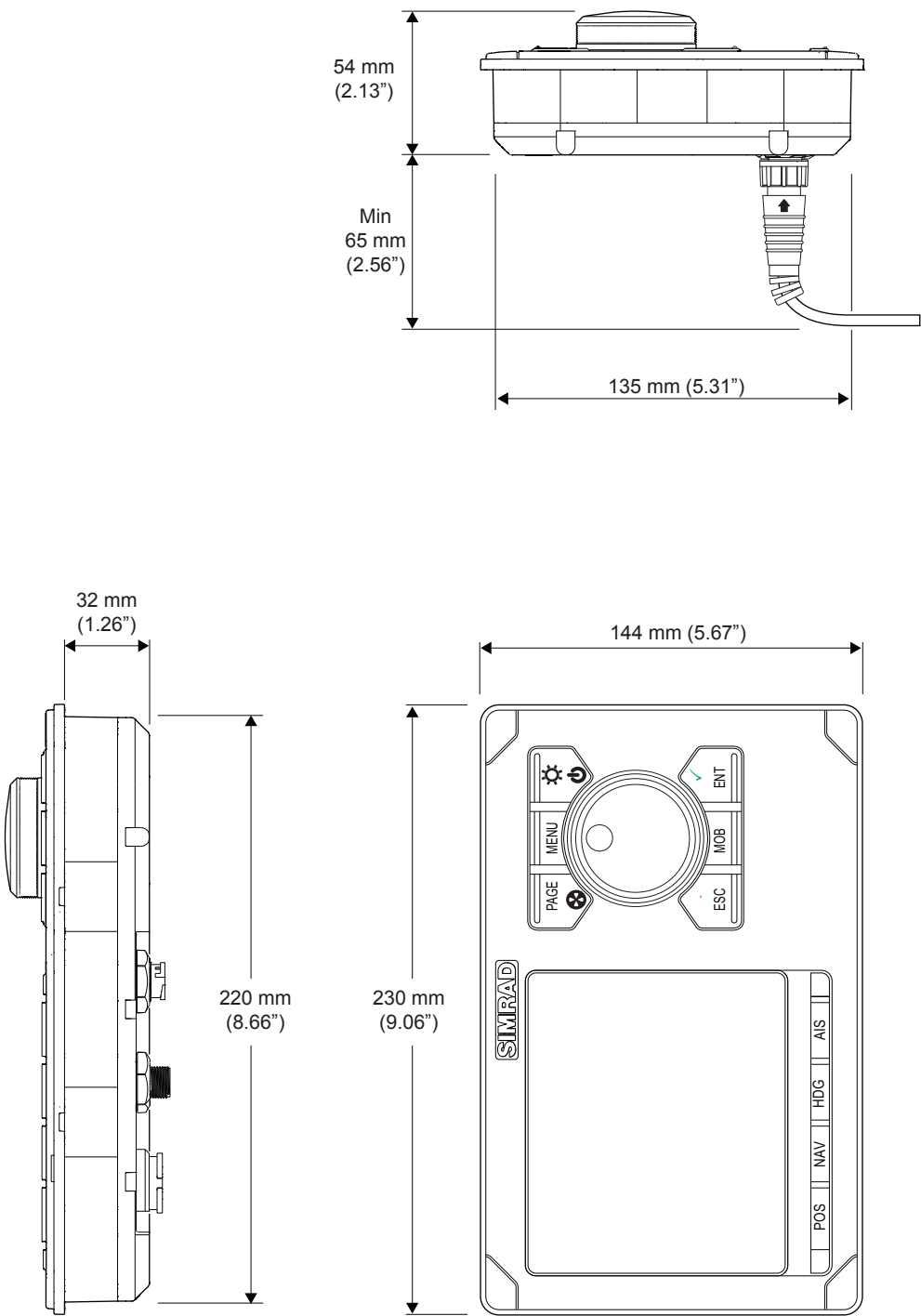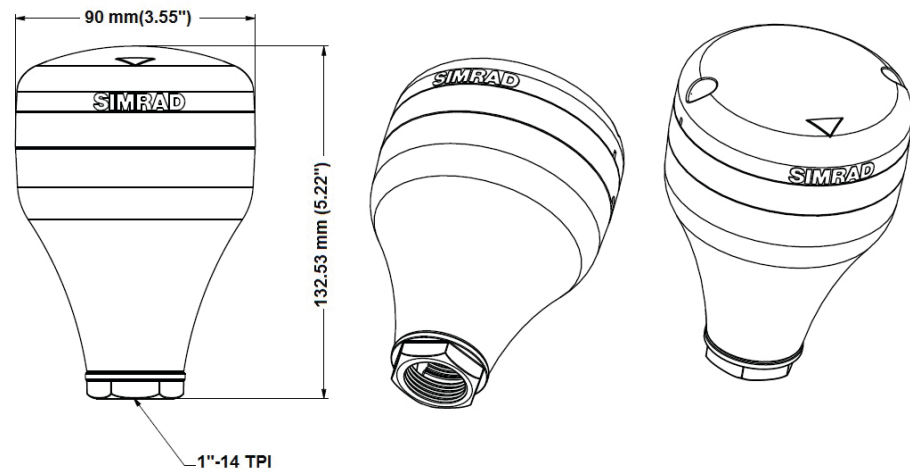
## GS70 antenna unit



## MX521A smart D/GPS antenna unit

## HS80/MX575C D/GPS compass unit

209.16 mm (8.234 in)

122.32 mm
(4.815 in)

668.54 mm (26.320 in)

SET SCREW
3/8-16 UNC THREAD SIZE
2 PLACES

31.75 mm
(1.25")

101.60 mm
(4.000 in)

MOUNTING HOLE
1-14 UNS THREAD SIZE

MOUNTING HOLE
M8-1.25 THREAD SIZE
8 PLACES

63.50 mm
(2.500 in)

46.99 mm
(1.850 in)

This drawing shows
the NMEA 2000
adapter attached

50.80 mm
(2.000 in)

93.98 mm
(3.700 in)

76.20 mm
(3.000 in)

## MX610 JB smart junction box unit



Dimensional drawing of the MX610 JB smart junction box unit. Front view: 211 mm (8.29"), 197 mm (7.77"), 185 mm (7.27") widths; 180 mm (7.08"), 80 mm (3.15"), 48 mm (1.88") heights. Side view: 60 mm (2.36") depth.

# 15

## Wiring

### Wiring guidelines

The CAN network cables and other signal cables (i.e. antenna, compass, NMEA) should not be run in parallel with other cables carrying radio frequency or high current, such as VHF and SSB transmitters, battery chargers/generators, and winches.

Don't make sharp bends in the cables, and avoid running cables in a way that allows water to flow down into the connectors. If required, make drip and service loops.

If cables are shortened, lengthened or re-terminated, do insulate and protect all wiring connections.

Most of the units are communicating on the CAN bus with drop cables. Try mounting the units within the standard cable length supplied with each unit. Additional cables and cable extensions are available from our distributors.

> ⚠ **Warning:** Before starting the installation, be sure to turn electrical power off. If power is left on or turned on during the installation, fire, electrical shock, or other serious injury may occur. Be sure that the voltage of the power supply is compatible with the spec for the units!

### The GN70 navigation system; basic wiring principles

The GN70 navigation system use a CAN bus backbone which makes it simple to interface to SimNet and NMEA 2000 (N2K) devices.

NMEA 0183 devices such as autopilots, radar and PC-based ECDIS can be interfaced using the optional MX610JB smart junction box. The 12-Volt DC power to the CAN bus can be supplied through a T-Connector.

In systems with the optional MX610JB junction box the CAN bus is powered by the junction box. The GN70 model have separate power supply cable and can be wired directly to 12-24 VDC. Other SimNet/NMEA devices are powered by the CAN bus.

The following sections describe installation of the components listed in the illustration below. Refer to separate manuals for detailed information about each interfacing unit.
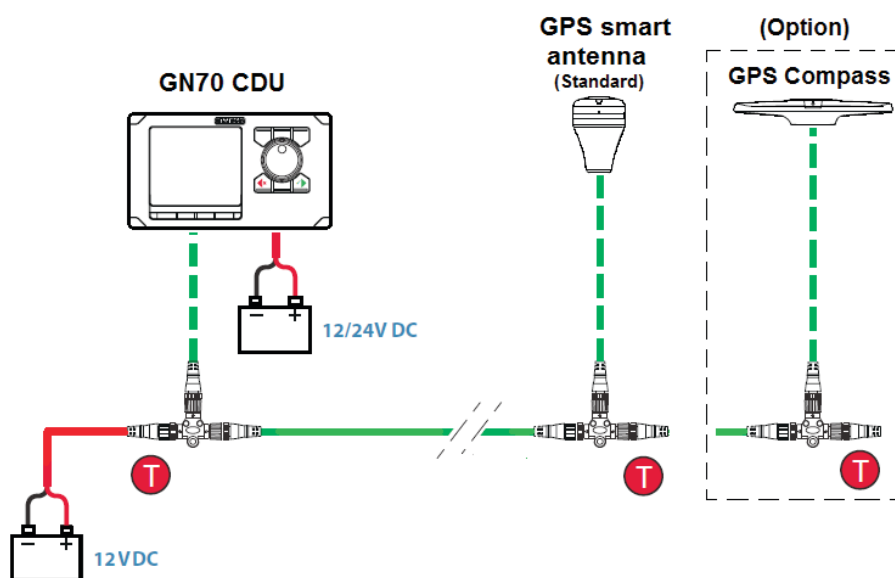


*GN70 basic wiring diagram*

> → *Note:* One or more smart antenna units can be connected in the N2K backbone. Please make sure that the total current drain equals (or less) than 50 mA each.

## The CAN bus

The CAN bus is based on the well known SimNet plug & play concept and on the NMEA 2000 (N2K) SAE J1939 protocol. Hard wiring is based on standard NMEA 2000 cables with Micro-C type connectors and joiners.

The bus consists of a linear backbone using drop cables and Micro-C T-joiners for connecting NMEA 2000 and SimNet devices.

The bus has a maximum cable length of 150 m (500 ft), and a drop cable has a maximum length of 6 m (20 ft).

In a default GN70 system the CAN bus backbone expands from the MX610JB, which supplies power to the backbone. There will always be a female connector in the expanding end of the backbone cables.
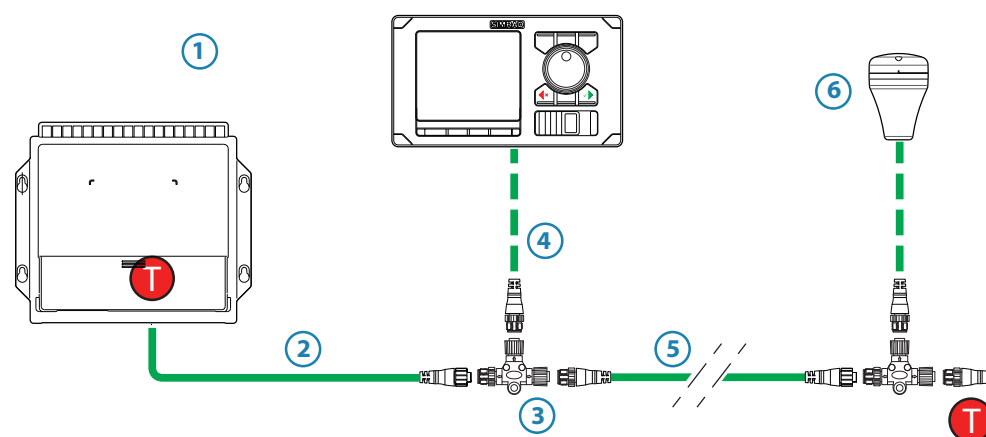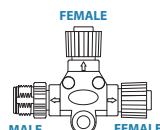
**FEMALE**

**MALE    FEMALE**

*GN70 with MX610 junction box wiring diagram*

| Key | Description |
|-----|-------------|
| 1 | MX610JB junction box with built-in CAN bus terminator (optional) |
| 2 | 0,6 m (2 ft) pigtail cable, female connector |
| 3 | Micro-C T-joiner |
| 4 | CAN bus Drop cable, connectors in each end (female - male) |
| 5 | CAN bus Backbone, various lengths available. Connectors in each end |
| 6 | GS70 smart antenna |
| T | Terminator, 120 Ohm, male |

➔ *Note:* If cables are not supplied by Simrad, ensure that they meet NMEA 2000/IEC61162-1/2 requirements.

### Planning and installing a network backbone

• Plan the network carefully
  - It is recommended to create a diagram of the network prior to starting the installation
• Run the backbone between the locations of all CAN devices you want to install
  - It must be less than 6 m (20 ft) cable run from a device to the backbone
• Consider the load/current draw from the devices

For details on network cables and components, refer to our websites:
pro.simrad-yachting.com and www.simrad-yachting.com

### Terminating the CAN bus

The CAN bus must have a 120 Ohm terminator at each end of the backbone.

In a default GN70 system the CAN bus can be powered and terminated from the junction box PCB, enabled by the micro switch.

- Set the switch to ON when the MX610JB board is at the end of the CAN bus
- Set the switch to OFF when the MX610JB board is used as additional power supply to the CAN bus which already has correct termination.

Factory default setting of MX610JB terminator is OFF.

For location of the dip switch, refer to the illustrations inside the computer unit.

A terminator in the other end of the CAN bus can be one of the following:

- A power cable with built in terminator (plug marked 120 ohm)
- A single terminator plug (marked 120 ohm)

### Shield connection

It is required to use shielded cables to meet radio frequency interference requirements as defined in the NMEA 2000 specification:

- The shield shall not be electrically connected within the interface to the electronic device chassis or ground
- The shield shall be electrically continuous through the network connection
- The shield shall be connected to ground at a single point, normally the ship's ground at the source of network power

## Power supply

→ *Note:* Wheelmark/US Coast Guard approved systems require a Power Failure alarm. In such installations the GN70 and the MX610JB must be connected to different independent power supplies.

→ *Note:* It is recommended to install an external on/off switch or circuit breaker for the Junction Box power supply.

→ *Note:* Do not connect the power cable to the same terminals as the start batteries, drive units, thruster or other high current products

→ *Note:* If joining to an existing NMEA 2000 network or similar CAN bus network that has its own power supply, use an NMEA 2000 Gateway to isolate the two power supplies.

### Powering the CAN (N2K) bus

For larger systems additional power should be added at a central point in the backbone to balance the voltage drop of the network. Additional power may be supplied by using an MX610JB junction box or through a Micro T-Joiner.
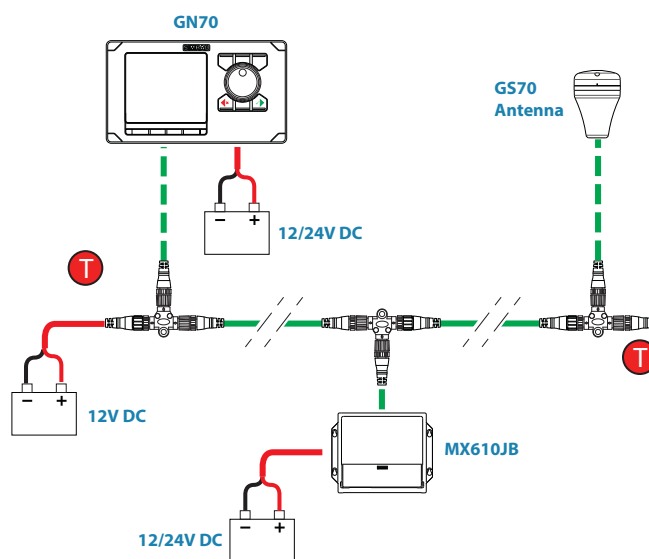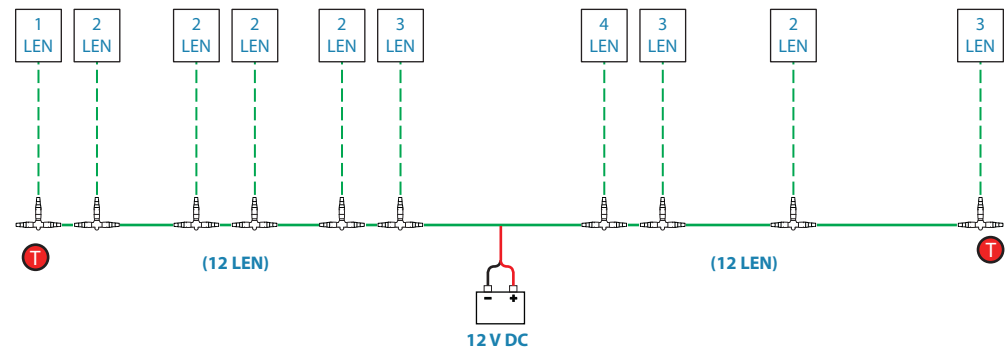


*N2K power diagram*

## Network LEN

When you have a larger system with network power in center of the backbone you should make the installation such that the load/current draw from the devices in each side/branch is equal.

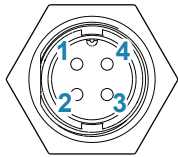→ *Note:* 1 LEN (Load Equivalency Number) equals 50 mA current draw.



*N2K system with balance load*

## Powering the GN70 display units

The GN70 control units are powered directly from a 12 V DC or 24 V DC source.

The units are protected against reverse polarity, under voltage and over voltage.

| Key | Color | Description |
|-----|-------|-------------|
| 1 | Black | Battery (-) |
| 2 | Blue | External Alarm |
| 3 | Yellow | External MOB |
| 4 | Red | Battery (+), 12 - 24 V DC |

→ *Note:* It is recommended to install an external circuit breaker switch for power.

→ *Note:* Do not connect the power cable to the same terminals as the start batteries, drive units, thruster or other high current products.
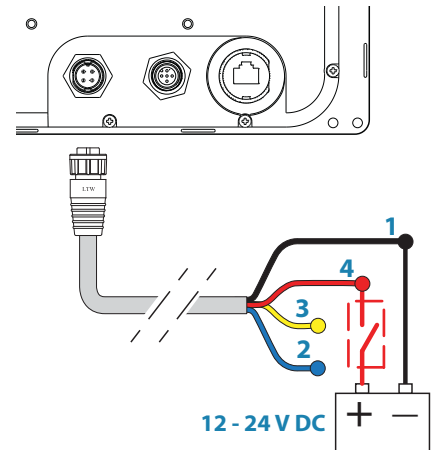
## NMEA 2000 and SimNet devices

NMEA 2000 devices can be connected to the CAN bus providing they are NMEA 2000 certified, meet the CE, FCC regulations and do not exceed the load specification.

NMEA 2000 devices and SimNet devices with Micro-C connectors connects directly to the CAN bus backbone using drop cables and Micro-C T-joiners.

➔ *Note:* It is recommended to use a gateway when connecting non-Simrad units to the CAN bus backbone.

Devices with SimNet connectors only must be connected using a SimNet to Micro-C adapter cable.



*SimNet System*
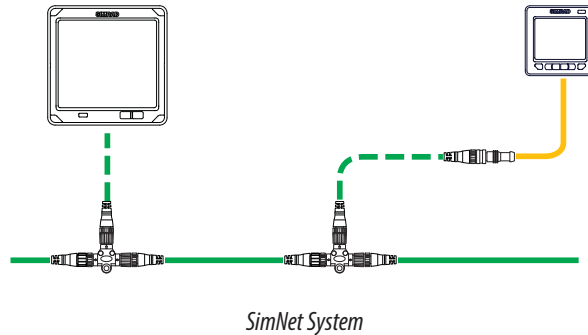
## IEC61162-1/2 (NMEA 0183) Devices

Connects to:      MX610JB board (in MX610JB computer).

The MX610JB board includes 4 NMEA Port terminals.



*NMEA 0183 wiring hookup to MX610JB*
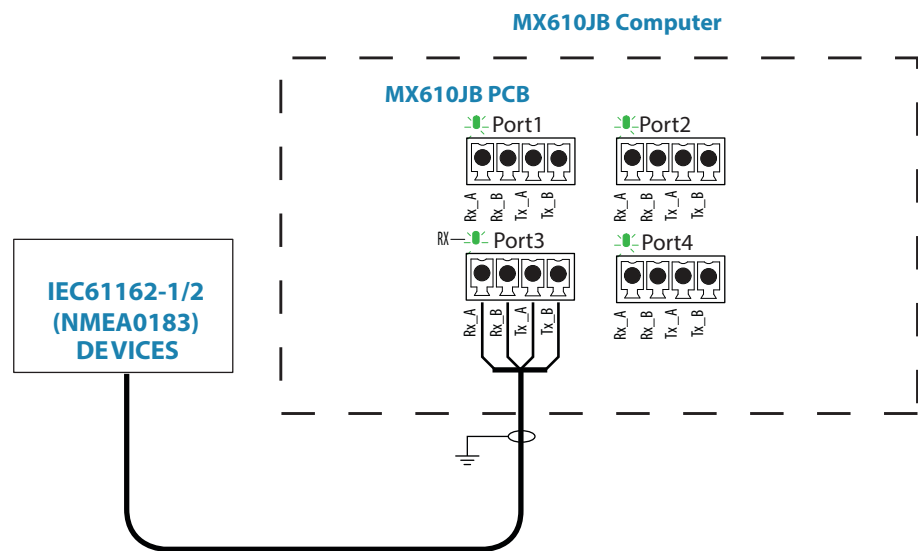
The green LED at each NMEA port terminal will flash when serial data is received.

The MX610JB board uses the serial RS422 (IEC 61162-1/2) standard and can be configured in the GN70 for different baud rates, up to 38,400 baud (default baud rate is 4800). Sentence output by the GN70 can be individually turned on or off.  The default NMEA sentence setting is off.

## Connecting the MX610JB computer to the N2K bus

The MX610JB smart junction box can connect anywhere on the N2K bus back bone by using drop cables connected to a female connector on the Micro-C T-joiner.

Drop cables of varying lengths can be purchased from local SIMRAD dealers.
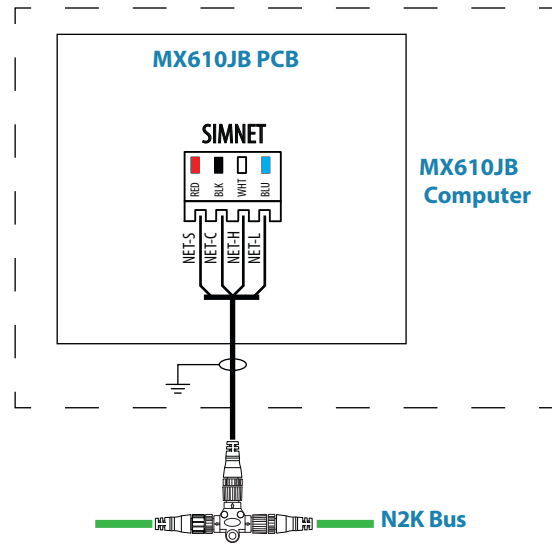


*MX610JJB connection to NMEA 2000 Bus*

# Alarm interface

### External alarm

An external alarm can be connected to the GN70 display unit. The alarm signal have an open contact for an alarm buzzer or an external alarm relay as illustrated below. The alarm voltage is the same as the main supply voltage. The maximum load on the external alarm output is 0.75 Amp.

Alarms are configured globally in the system, i.e. they can be configured on one unit and seen, heard and acknowledged from all other SIMRAD control units.
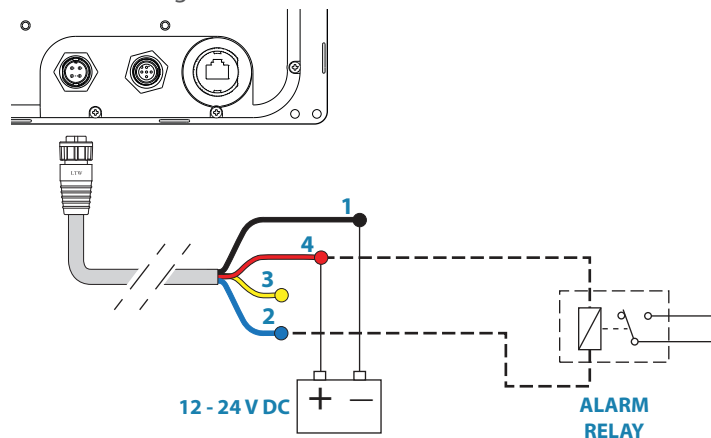


*External alarm connection*
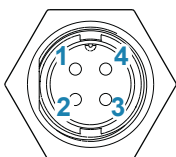
| Key | Color | Description |
|-----|-------|-------------|
| 1 | Black | Battery (-) |
| 2 | Blue | External Alarm |
| 3 | Yellow | External MOB |
| 4 | Red | Battery (+), 12 - 24 V DC |

**External Alarm Setup**

The siren must be enabled in order for the unit to drive the external alarm when an alarm condition arises.

## External MOB command

An external N.O. (Normally Open) push button switch can be used to mark your present position and activate the MOB feature (see diagram below for connection).

A momentary press on the Ext. MOB switch will save the MOB point and calculate the range and bearing back to the MOB point.

To stop the MOB, press the **MENU** key. The Cancel navigation menu will be highlighted, press the **ENT** key. Press **CLR** or any of the hot keys to exit.
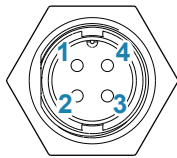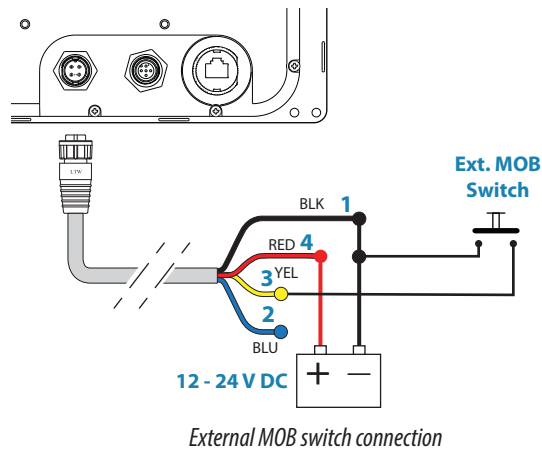


*External MOB switch connection*

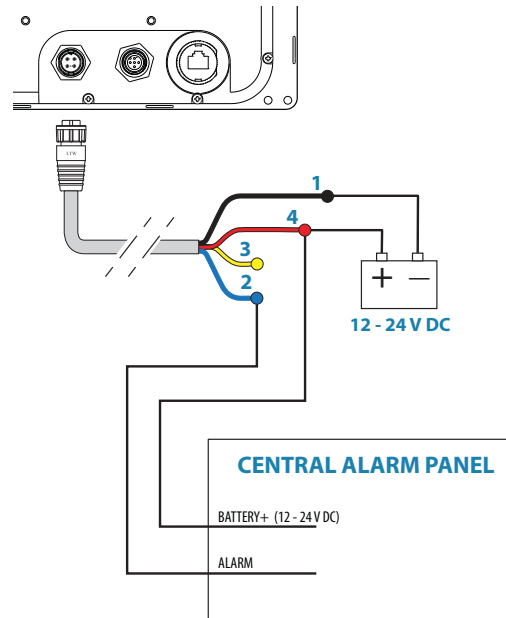| Key | Color | Description |
|-----|-------|-------------|
| 1 | Black | Battery (-) |
| 2 | Blue | External Alarm |
| 3 | Yellow | External MOB |
| 4 | Red | Battery (+), 12 - 24 V DC |

### Central alarm panel with direct I/O interface

The interfacing described below applies for central alarm panels that use direct lines for alarm, mute and acknowledge. For alarm panel using serial interface, refer to "IEC61162-1/2 (NMEA 0183) Devices" on page 67.

From the GN70 unit we are using the same two wires (red and blue) as for external alarm relay connection.

Under normal operation you will see 12/24 V between these two wires. In an alarm situation, or when power is lost, you will see no voltage.



*External alarm wiring Connection*
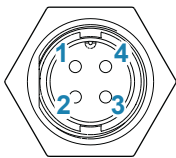
| Key | Color | Description |
|-----|--------|-----------------------------|
| 1 | Black | Battery (-) |
| 2 | Blue | External Alarm |
| 3 | Yellow | External MOB |
| 4 | Red | Battery (+), 12 - 24 V DC |

**GN70 with MX521A smart antenna and MX525A sensor connections**

GN70

MX521A

MXB5 ANT.

12/24V DC

MX525A

MX610JB

12/24V DC

Ports 3&4

Port 1

Port 2

**Where:**

N2K Backbone

Drop line

NMEA 0183 line
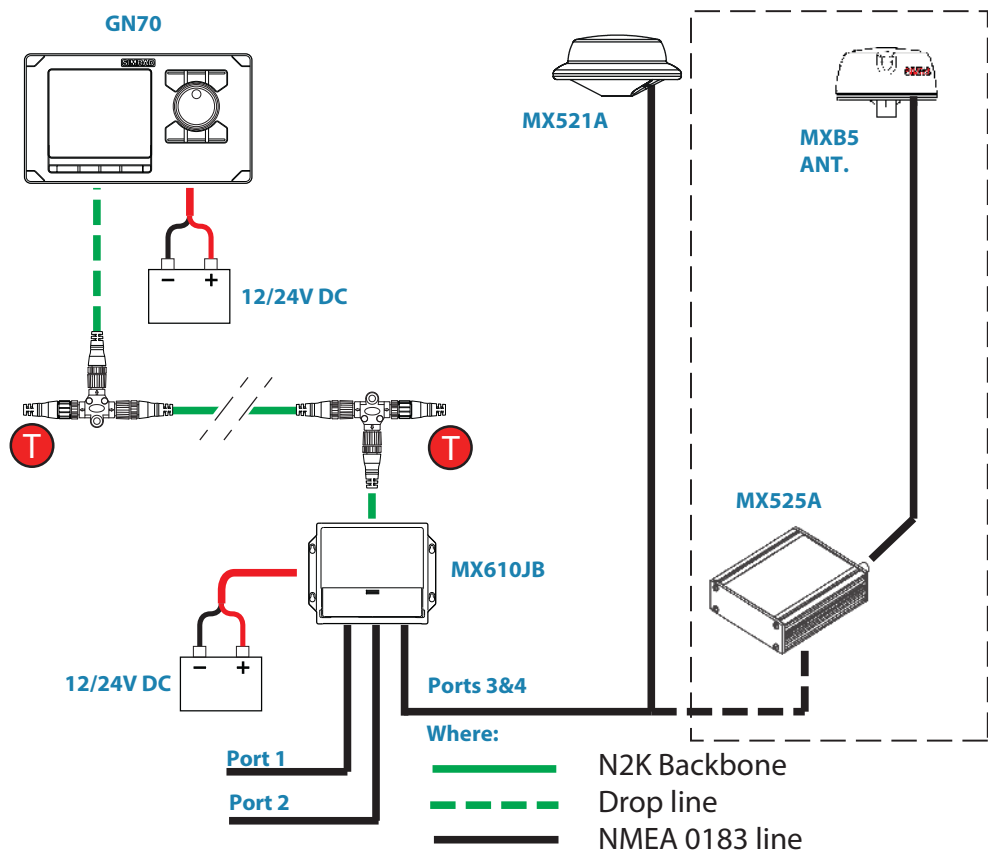
*GN70, MX610JB junction box and MX521A/MX525A diagram*

GN70

GS70 Antenna

12/24V DC

12V DC

MX610JB

12/24V DC

P2

EXT. RTCM @9600 Baud

P2 — Plug-in Conn.

RTCM (-)
RTCM (+)
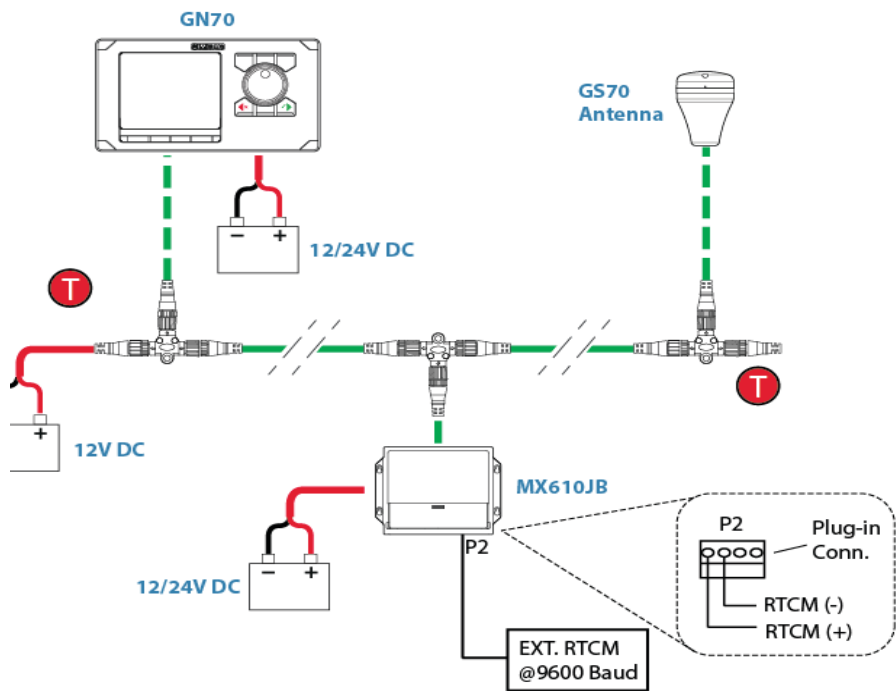
*External Differential Correction connection to GS70 though the MX610JB junction*

## MX610JB PCB Terminals

**MX521A**



ANTENNA CABLE

SIMNET

TERMINATION

SIMNET

PORT1    PORT2

REMOTE    PORT3    PORT4    SUPPLY
                            +    -

RED
BLK

GRY
PRPL
YEL
WHT
BLU
BRN
ORG
GRN

NMEA 0183 PORT
CONNECTOR TERMINALS

RX+  RX-  TX+  TX-
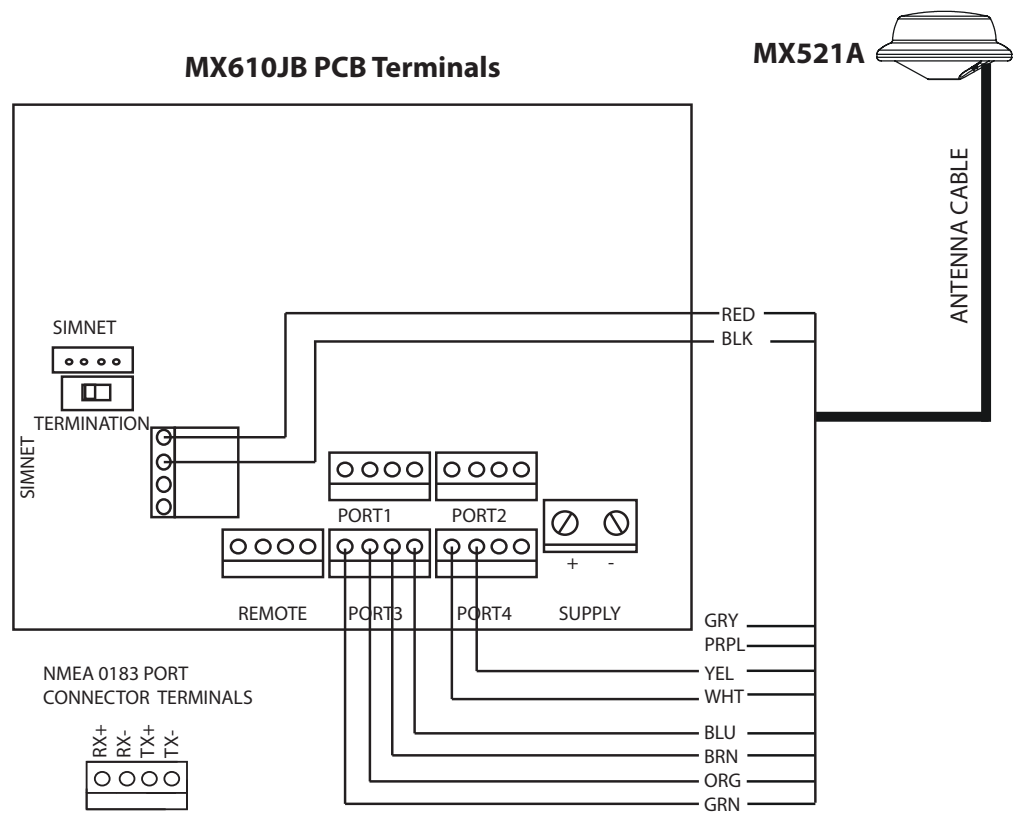
*MX521A to MX610JB  wiring Diagram*

---

MXB5

COAX ANTENNA CABLE

## MX610JB PCB Terminals

**MX525A**

SIMNET

TERMINATION

SIMNET

PORT1    PORT2

REMOTE    PORT3    PORT4    SUPPLY
                            +    -

RED
BLK

3-Meter
Power/Data Cable

GRY
PRPL
YEL
WHT
BLU
BRN
ORG
GRN

NMEA 0183 PORT
CONNECTOR TERMINALS

RX+  RX-  TX+  TX-
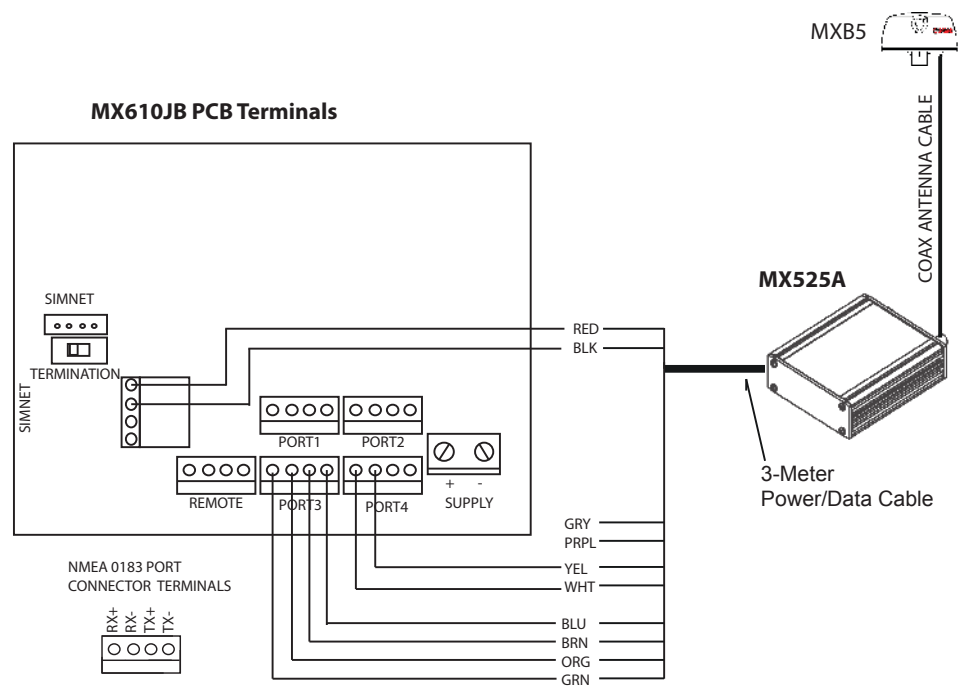
*MX525A to MX610 J-Box wiring diagram*

**MX575C/HS80
GPS Compass**

**GN70**

**12/24V DC**

**T**        **T**

**MX610JB**

**12/24V DC**

**Ports 3&4**

**Port 1**

**Port 2**

**Where:**

N2K Backbone
Drop line
NMEA 0183 line
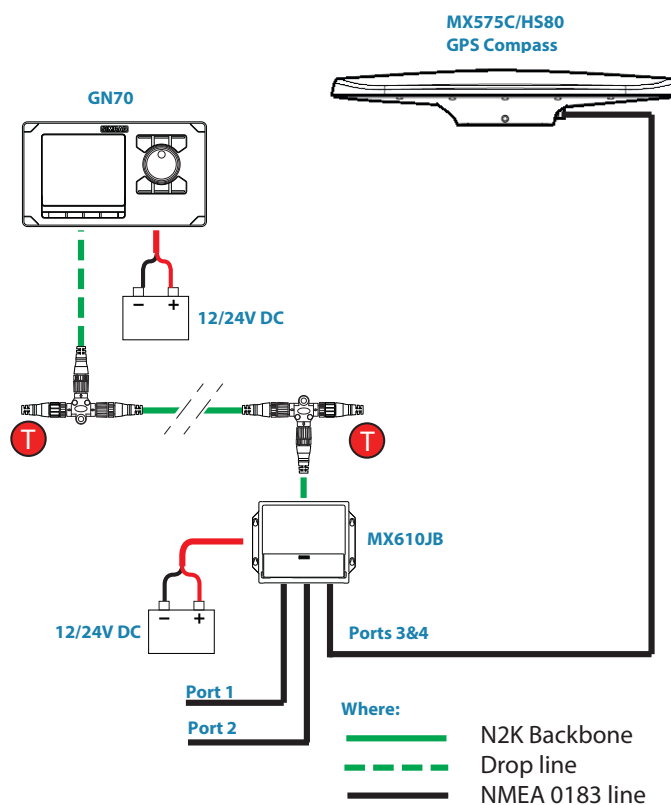
*GN70 system with MX575C GPS compass diagram*

**MX575C
GPS Compass**

ANTENNA CABLE

**MX610JB PCB Terminals**

SIMNET

TERMINATION

SIMNET

PORT1    PORT2

REMOTE    PORT3    PORT4    SUPPLY
+   −

RED
BLK

GRN
BLK/GRN

BRN
BLK/BRN
YEL
YEL/BLK

NMEA 0183 PORT
CONNECTOR TERMINALS

RX+  RX−  TX+  TX−
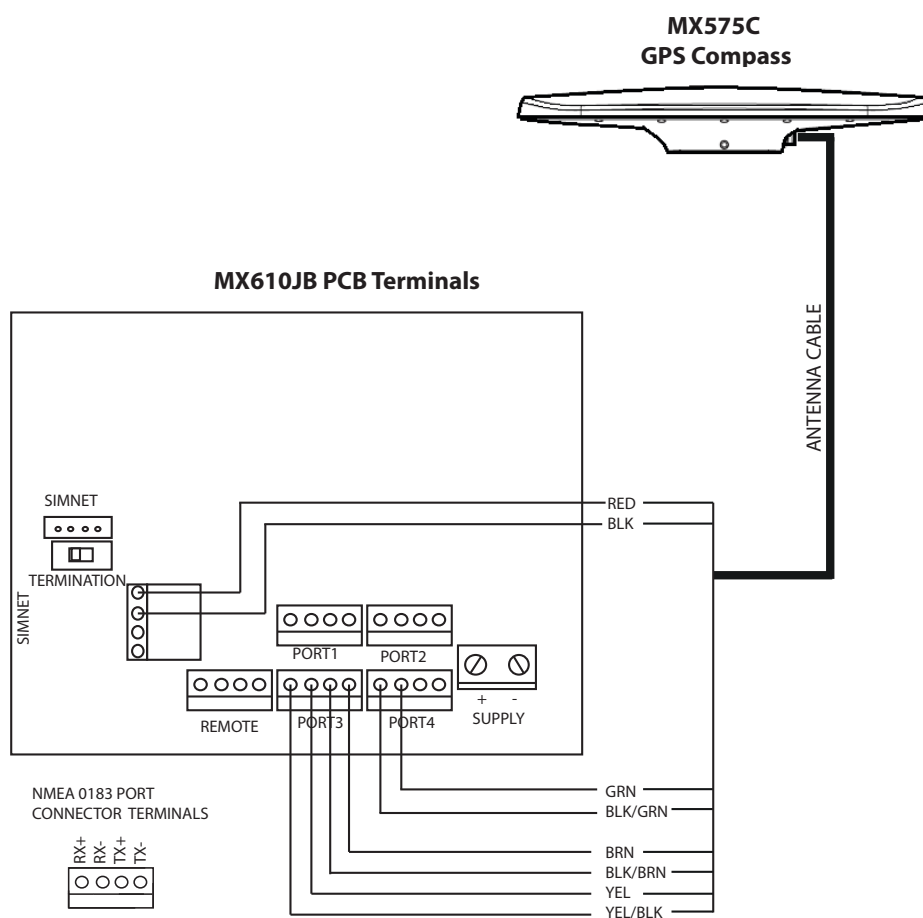
*NMEA 0183 connection of the MX575C to MX610JB wiring diagram*

# 16 Technical specifications

➔ *Note:* For updated technical specifications, compliance and certifications, refer to our web site at http://pro.simrad-yachting.com

## GN70 control unit

| | | |
|---|---|---|
| DISPLAY | | |
| Size | 5 in. (127 mm) | |
| Resolution (HxW) | 480x480 | |
| Type | 16-bit color TFT | |
| Antifog | Bonded LCD | |
| Best viewing direction | Any direction | |
| Backlight | Cold Cathode Fluorescent Lamp (CCFL) | |
| NETWORKING | | |
| CAN bus | NMEA 2000 (N2K) | |
| Ethernet (LAN) | Yes- used for sw update and NMEA 0183/IP | |
| POWER | | |
| Local supply | 12/24 V DC +30-10% | |
| Consumption local supply | 0.7/0.4 A at 12 V DC 0.4/0.3 A at 24 V DC "backlight full/off" | |
| NMEA 2000 LEN* (50 mA) | 1 | |
| INTERFACE | External alarm/Active unit output  max 100 mA, 4.5 A short circuit limit | |
| | External MOB input, contact current max 8 mA | |
| ENVIRONMENT | | |
| Temperature, operation | -30°C to +55°C (-22°F to 131°F) | |
| Temperature, storage | -25°C to +70°C (-13°F to 158°F) | |
| Protection | IPx4 | |
| MECHANICAL | | |
| Weight | 1,2 kg (2.7 lbs) | |
| Size | 230 (W) x 144 (H) x 54 (D) mm | |
| Mounting | Panel (flush) or optional bracket | |
| Material | Epoxy coated seawater resistant aluminium back cover, plastic front bezel | |
| Color | Black and grey | |
| Cable inlet | 1 Power/alarm, 1 Micro-C connectors | |

* LEN - NMEA 2000 Load Equivalent Number.  Where 1 LEN draws about 50 mA current from the N2K network.

# MX610JB  junction box (optional equipment)

| | |
|---|---|
| **POWER** | |
| Local supply | 12/24 V DC, +30 - 10%. |
| Consumption local supply | 0,3 - 5 A<br>CAN bus load dependent |
| NMEA 2000 LEN* (50 mA) | 1 |
| Output for CAN bus supply | 15 V DC, +/- 5%, 4 A max |
| **ENVIRONMENT** | |
| Temperature, operation | -15°C to +55°C (5°F to 131°F) |
| Temperature, storage | -30°C to +70°C (-22°F to 158°F) |
| Protection | IPx2 |
| **MECHANICAL** | |
| Weight | 0,9 kg (2 lbs) |
| Size (length x width x height) | 185(W) x 180 (H) x 60 (D) mm |
| Mounting | Bulkhead |
| Material | Plastic + Anodized aluminium |
| Color | Black |
| Cable inlet | Slots:  9 x 95 mm and 18 x 45 mm<br>(0.4" x 3.7" and 0.7" x 1.8") |
| **Data I/O** | |
| NMEA 2000 | 1x CAN bus |
| NMEA 0183 | 4x Bidirectional  RS-422 Serial ports (+/-5 V) |
| Baud rate | 4800 (default) configurable by GN70 |
| Log Pulses I/O | 1x Bidirectional RS-422 port (PPM configurable by GN70) |

# Smart antenna unit

| | GS70 | MX521A | HS80/MX575C |
|---|---|---|---|
| Receiver Type | L1,L2 C/A code, 1.575/1.602 GHz | L1 C/A Code @ 1.575 GHz | |
| Number of Channels | 32 | 12 | 12 |
| Position Update rate | Up to 10 Hz (1,5,10) | Up to 10 Hz (1,2,5,10) | Up to 10 Hz (1,2,5,10) |
| GPS Accuracy (2 DRMS) | 5 m | 3 m | 3 m |
| DGPS Accuracy | 3 m | 1 m | 1 m |
| Cold start | 50 sec. | 60 sec. | 60 sec. |
| Warm start | 3 sec. | 10 sec. | 10 sec. |
| WAAS | Yes | Yes | Yes |
| Beacon receiver | No | Yes | HS80 - No MX575C - Yes |
| Input voltage | 9-18 VDC | 10-32 VDC | 10-32 VDC |
| Reverse polarity protection | Yes | Yes | Yes |
| Power consumption | <2 Watts | <2 Watts | <3 Watts |
| Data I/O Protocol | NMEA 2000 | NMEA 1083 | NMEA 2000/0183 |
| POWER | | | |
| Local supply | 9-18 VDC | 12/24 V DC +30-10% | |
| Consumption local supply | < 100 mA @ 12 VDC | <150 mA @ 12 VDC | <200 mA @ 12 VDC |
| NMEA 2000 LEN* (50 mA) | 3 | N/A | 4 |
| Output for CAN bus supply | 15 V DC, +/- 5%, 4 A max | N/A | 15 V DC, +/- 5%, 4 A max |
| ENVIRONMENT | | | |
| Temperature, operation | -25°C to +60°C | -15°C to +55°C | -15°C to +55°C |
| Temperature, storage | -40°C to +85°C | -30°C to +70°C | -30°C to +70°C |
| Protection | IPX6,7 (Exposed category) | | |
| MECHANICAL | | | |
| Weight | 0.3 lbs. | 1.3 lbs. | 5.38 lb. |
| Size (length x width x height) | 90 mm (Dia.) x 38mm (height) | 182 mm (Dia.) 102 mm (H) | 209.16 mm (W) 668.54 mm (L) 122.32 mm (H) |
| Connector | N2K Micro C | 10-Pin Round | 18-Pin Round (N2K adapter option) |
| Mounting | Flush mount or Pole | Pole | Flush mount or Pole |
| Material | Plastic | | |
| Color | White | White w/ red band | White -top, dark gray - bottom |

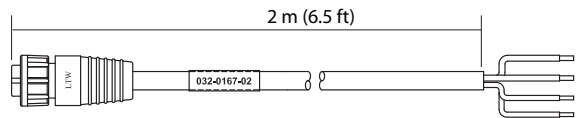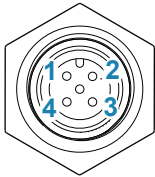➔ *LEN - Load Equivalent Number @ 50 mA.

# GN70 Connector Pinouts



1 **Power**

2 **N2K bus**

3 **Ethernet**
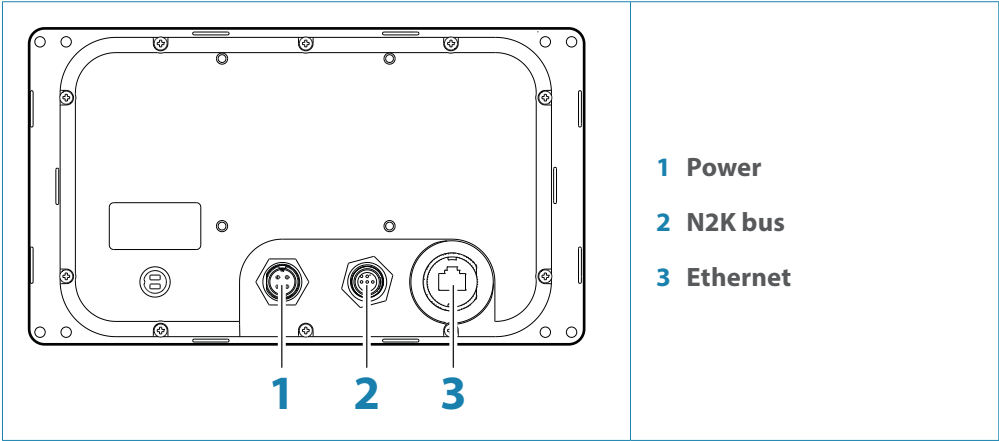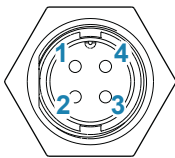
## Power

**Connector (male)**

| Layout | Pin | Wire Color | Function |
|---|---|---|---|
| | 1 | Black | Battery (-) |
| | 2 | Blue | Alarm/Active |
| | 3 | Yellow | External MOB |
| | 4 | Red | Battery (+), 12 - 24 V DC |

**Power cable**



2 m (6.5 ft)

032-0167-02

## CAN/NMEA 2000

**Micro-C Connector (male)**

| Layout | Pin | Wire Color | Function |
|---|---|---|---|
| | 1 | Blue | NET H |
| | 2 | Red | NET S (+12 V) |
| | 3 | Black | NET C (-) |
| | 4 | (Bare) | Shield |
| | 5 | White | NET L |

## Ethernet

➔ *Note:* Use crossed (red) Ethernet cable for software upload!

# Supported data

## IEC61162-1/2 (NMEA 0183) interfaces channels

| Channel | Default name | Default sentences | Default Baud rate |
|---------|--------------|-------------------|-------------------|
| 1 | PORT 1 | Off | 4800 |
| 2 | PORT 2 | Off | 4800 |
| 3 | PORT 3 (MX ANTENNA - GPS I/O)* | Off | 4800 (19.2K) |
| 4 | PORT 4 (MX ANTENNA - BEACON Out)* | Off | 4800 |

* Option for MX521A, MX525A and MX575C antenna connection

## GN70 communications

| Sentence | NMEA 0183 In | NMEA 0183 Out | NMEA2000 messages | Message Data Type |
|----------|:---:|:---:|-------------------|-------------------|
| AAM | √ | √ | 129284 | Waypoint Arrival Alarm |
| ACK | | √ | 130846, 130850 | Acknowledge Alarm |
| ALR | | √ | 130846 | Set Alarm State |
| BOD | √ | √ | 129284 | Bearing Origin to Destination |
| BWC | √ | √ | 129284 | Bearing & Distance to Waypoint |
| DPT | √ | √ | 128267 | Depth |
| DTM | √ | √ | 129044 | Datum |
| GGA | √ | √ | 129025, 129029 | Global Position System Fix data |
| GLL | √ | √ | 129025, 129029 | Geographic Position - Lat/Lon |
| GRS | √ | √ | 129540 | GNSS Range Residuals |
| GSA | √ | √ | 129539 | GNS DOP's And Active Satellites |
| GSV | √ | √ | 129540 | GNSS Sats in View |
| HDG | √ | √ | 127250 | Heading Deviation & Variation |
| HDT | √ | √ | 127250 | Heading True |
| MWV | √ | √ | 130306 | Wind Data |
| RMC | √ | √ | 129025, 129029,129284 | Recommended Minimum Specific GNSS Data |
| ROT | √ | √ | 127251 | Rate Of Turn |
| RTE | TBD | TBD | | Routes |
| THS | √ | √ | 127250, 130577 | True Heading |
| VBW | √ | √ | 130578 | Dual Ground/Water Speed |
| VLW | √ | √ | 128275 | Dual Ground/Water Distance |
| VHW | √ | √ | 128259, 127250 | Water Speed and Heading |
| VTG | √ | √ | 129026 | Course and Speed Over Ground |
| WPL | TBD | TBD | | Waypoints |
| XTE | √ | √ | 129283 | Cross Track Error, Measured |
| ZDA | √ | √ | 129033 | Time & Date |
| **Proprietary messages** | | | | |
| $PMVXG,GBS | √ | | 129545, 129029 | Fills in RAIM integrity in 129029 field |
| $PCSI,CS0 | √ | | 129551 | Beacon/WAAS Reference station data |
| $PMVXG,312 | √ | | 129549 | DGPS Corrections |
| $PMVXG,310 | √ | | 129539 | GNS DOP'S  (additional DOP messages) |
| $PMVXG,313 | √ | | 129541 | GPS Satellite Health |

**GS70/HS80 smart antenna communications**

| NMEA 2000 messages | |
|---|---|
| **PGN number** | **PGN Title** |
| 59392 | ISO Acknowledgement |
| 59904 | ISO Request |
| 60928 | ISO Address Claim |
| 126996 | Product Information |
| **GPS related** | |
| 65293 | Configuration Message |
| 126992 | System Time |
| 129025 | Positionon, RU |
| 129026 | COG & SOG RU |
| 129029 | Position Data |
| 129539 | GNS DOP |
| 129540 | GNS Satellites in view |
| 127258 | Magnetic variation |
| **Compass related** | |
| 127250 | Compass Heading (Vessel Heading) |
| 130845 | Parameter Handle |
| 127251 | Rate of Turn |
| 127257 | Attitude |
| **RAIM feature** | |
| 129545 | GNSS RAIM output |
| 129546 | GNSS RAIM settings |
| 129542 | GNSS Pseudorange noise statistics |
| 129547 | GNSS Pseudorange error statistics |
| **RTCM correction** | |
| 129549 | Ext. RTCM correction data |
| 130852 | RTCM feedback to GN70 |
| | |
| | |

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**SIMRAD**