SIMRAD

PRO SERIES

GN70
MX610/MX612

Operator Manual
Addendum

ENGLISH

Addendum for GN70/MX61x CDU and MX61xJB junction box software updates

This addendum documents new features that are included in the new software for the GN70, MX610, MX612, MX610JB and MX612JB that are not included in the original manuals or other documentation.

Feature	GN70	MX610	MX612	Refer
GPS / GLONASS mode indicator	Yes	Yes	Yes	Sec. 1: Introduction - Page 7
GPS/GPS+GLONASS selector	Yes	Yes	Yes	Sec. 1: Introduction - Page 7
Setting the antenna port (port 3) baud rate	Yes	Yes	Yes	Sec. 5: System Configuration - Page 10
NMEA 0183 output over junction box	Yes	Yes	Yes	Sec. 5: System Configuration - Page 16
Determine unit's software version	Yes	Yes	Yes	Sec. 5: System Configuration - Page 18
CDU and antenna software version	Yes	Yes	Yes	Sec. 5: System Configuration - Page 18
All devices in the N2K network	Yes	Yes	Yes	Sec. 5: System Configuration - Page 19
GNSS Mode	Yes	Yes	Yes	Sec. 5: System Configuration - Page 19
GPS/GPS+GLONASS	Yes	Yes	Yes	Sec. 5: System Configuration - Page 20
Reset Procedure	Yes	Yes	Yes	Sec. 5: System Configuration - Page 21
How to reset the junction box	Yes	Yes	Yes	Sec. 5: System Configuration - Page 21
How to reset the MX antenna	Yes	Yes	Yes	Sec. 5: System Configuration - Page 22
How to restore the CDU to default settings	Yes	Yes	Yes	Sec. 5: System Configuration - Page 22
Maintenance/Troubleshooting	Yes	Yes	Yes	Sec. 12: Maintenance - Page 24
Software upgrades	Yes	Yes	Yes	Sec. 12: Maintenance - Page 26
MX610/MX612 CDU software update procedure (USB method)	No	Yes	Yes	Section 12: Maintenance - Page 26
MX61xJB software update procedure using the MX61x display (USB method)	No	Yes	Yes	Section 12: Maintenance - Page 26
GN70/MX61x software update using PC	Yes	Yes	Yes	Section 12: Maintenance - Page 27
Addition of MX521B, MX575D and HS80A antenna models	Yes	Yes	Yes	Sec. 15 - MX61s_Wiring - Page 32-34
Addition of new MX Antennas (MX521B, HS80A & MX575D)	Yes	Yes	Yes	Sec. 16 - Specifications Page 47-48

Contents

1 Introduction

The GN70/MX610/MX612 Front Panel and Keys
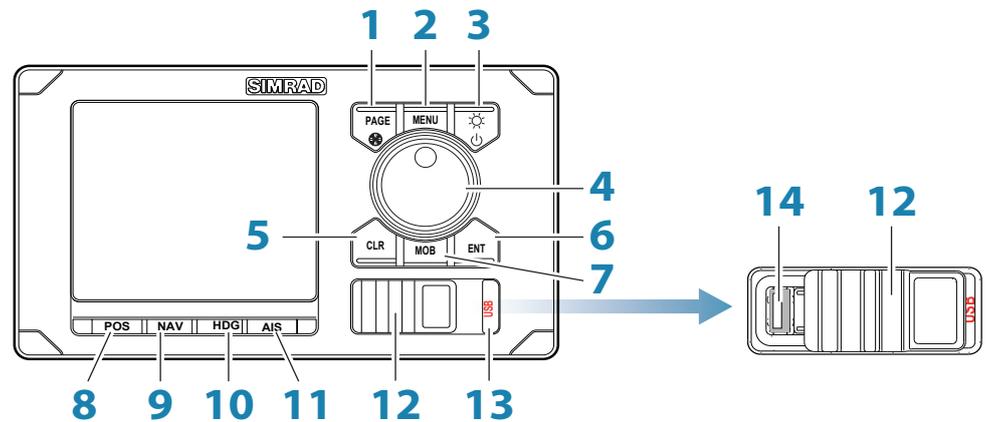
No.	Key Description
1	**PAGE** key: Brings up different screen page every time this key is pressed or to change tab in the settings and tools menu.
2	**MENU** key: Brings up the quick menu dialog box.
3	**PWR/LIGHT** key Short press - to turn ON the unit. Momentary press brings up the backlight and night view controls. Series of short presses will cycle through 6 levels of display brilliance. Long Press - to turn power off.
4	**ROTARY KNOB:** Rotate to scroll through the menu icons or numbers in the virtual keypad. 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: Press to clear, escape or back out of the menu or data entry.
6	**ENT** key: Press to accept menu selection or data entry. The same action as pressing the center of the rotary knob.
7	**MOB** key: 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: Hot key to display the present position Latitude, Longitude, COG, SOG, Date and Time. Press repeatedly to show POS1, POS2 or POS3 screens.
9	**NAV** key: Hot key to display the navigation information. Press repeatedly to show NAV1, NAV2 or NAV3 screens.
10	**HDG** key: Hot key to show the compass rose, Pitch, ROT and Yaw information coming from a gyro or a GPS compass. Press repeatedly to show HDG1 or HDG2 screens
11	**AIS** key: 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.
12	**USB** door: To open, lift the right tab and slide the cover to the right. To close, slide cover to left and push the tab down. Close USB door at all times to prevent moisture intrusion. (MX610 and MX612 only)
13	**USB** key: Press to display the files contained in the USB memory stick.
14	**USB** Connector

The MX610/MX612 Screens
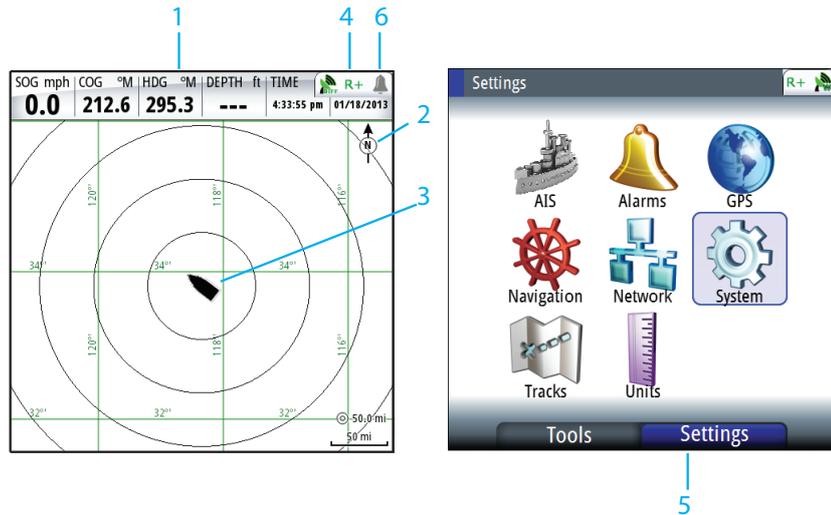
1 Instrument Bar

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

Mode Indicator

Icon	Description	Definition
GP	GPS Position	Position displayed is calculated using GPS satellites
GN	GPS +GLONASS Position	Position displayed is calculated from combined GPS and GLONASS satellites

Note: This feature is available in SIMRAD GN70/MX610/MX612 CDUs with software version 1.0.42.235 or higher.

GPS/GLONASS selection

By default, the SIMRAD CDU is set to navigate using the GPS satellite system. When using the MX521B smart antenna or the HS80A/MX575D smart GPS compass models, the SIMRAD CDU can be controlled to navigate using combined solutions from GPS and GLONASS satellites.

Setup procedure to use GPS and GLONASS satellites:

1.   Press the **MENU** key.
2.   Scroll **Tools & Settings** menu, press **ENT**.
3.   Scroll to **GPS** icon under the Settings page, press **ENT**.
4.   Scroll to **GNSS Mode**, press **ENT**.
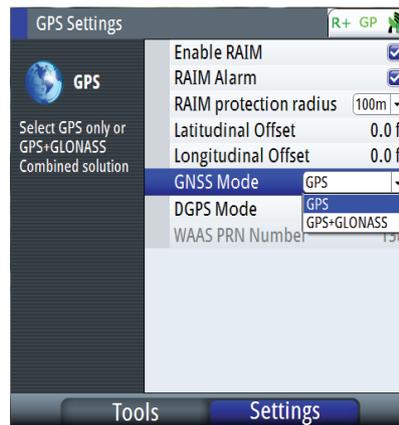
5.   Scroll to **GPS+GLONASS**, press **ENT**.
6.   Press the **CLR** key repeatedly or press any hot key to exit.

D/GPS Indicator

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 better than 1 meter.
	DGPS Position	Position Fix is augmented using the SBAS (WAAS, EGNOS or MSAS) signal correction. Position accuracy is better than 5 meters. Note: SBAS correction is not an IMO compliant system.

	Good GPS position	GPS Position is good but selected DGPS correction is temporarily not available. When **DGPS** mode menu is set to either Beacon or WAAS.
	Good GPS position	Good GPS position fix indication when MX610/MX612 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 5 (or more) satellites for proper operation.
	Alarm condition	A red bell icon indicates an alarm fault has been detected. The bell icon will be grayed-out when the alarm is corrected.

The RAIM feature and Alarm can be turned ON or OFF using the procedure below:

1. Press the **MENU** key.
2. Scroll down to **Tools & Settings** menu, press **ENT**.
3. Select the **GPS** icon, press **ENT**.
4. Scroll to **Enable RAIM** (or **RAIM Alarm**), press the **ENT** key to remove or leave a check mark.
5. Press the **CLR** key several times or any hot heys to exit.

5

System Configuration

General

When the GN70/MX610/MX612 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/MX610/MX612 correctly will prohibit the positioning and 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
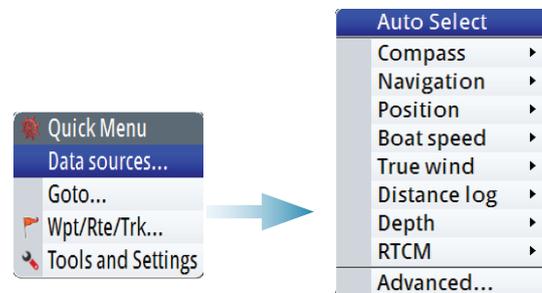
Network Settings

Selecting Data Sources

A data source can be a GPS sensor, smart junction box 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 of position selection is required on initial start up of the system, 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 the GN70/MX610/MX612 the display will ask you to do an auto selection of data sources. You can have it perform an auto selection by pressing the ENT key. It will search for all available source of position, navigation, compass 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.

→ *Note:* Only sources providing valid data are visible and can be selected

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.
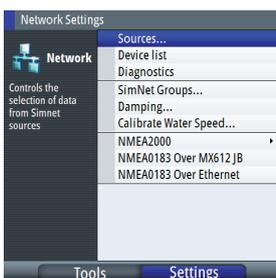
MX521A/MX525A/MX575C/MX575D Antenna setup

In the initial commissioning of the MX61x navigation system or when a new MX antenna is installed, you need to manually select the position data source of the GN70/MX610/MX612 when using the MX521A, MX525A, MX575C and MX575D smart GPS antenna sensors. They are normally connected via the NMEA 0183 ports #3 and #4 of the MX61xJB junction box.

Use the manual selection procedure below:

1. Press the **MENU** key.

2. Highlight the **Data sources** menu then press **ENT**.

3. Scroll to Position submenu then press **ENT**

4. Scroll to MXJB-NMEA3 [xxxxx#], where NMEA3 is Port 3 and xxxxx# is the serial number of the source as indicated on the junction box PCB then press the **ENT** key to place a check mark.

5. Press **CLR** key.

6. Scroll down to RTCM signal, press **ENT**.

7. Scroll to MXJB-NMEA4 [xxxxx#], press **ENT** to place a check mark.

8. Press the **CLR** key.

9. Scroll down to RTCM corrections, press **ENT**.

10. Scroll to MXJB-NMEA4 [xxxxx#], press **ENT** to place a check mark.

11. Press the **CLR** key to bring back the Quick Menu or any hot key to exit.

12. End of setup procedure
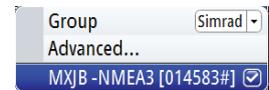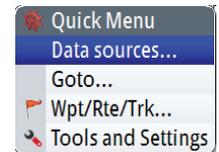
Setting the Antenna Port Baud Rate

If the CDU fails to detect the MX521A/MX525A/MX575C/MX575D antenna connected to NMEA3 of the J-Box, do the following:

1. Press the **MENU** key to bring up the quick menu.

2. Scroll to **Data sources**, press **ENT**.

3. Select **Position**, press **ENT**.

4. Deselect MXJB-NMEA3 as source of position.

5. Press the **CLR** key until the Settings menu appears (or press the **MENU** then scroll to **Tools & Setting**, press **ENT**).

6. Select **NETWORK**, press **ENT**.

7. Scroll to **Device List**, press **ENT**.

8. Scroll to **MXJB-NMEA3**, press **ENT**.

9. The **Configure** button will be highlighted, press the **ENT** key.

10. Scroll to **Baud rate**, press **ENT**.

11. Scroll to 4800 (or 19,200) baud, press **ENT**.

12. Press the **CLR** key several times to exit to Settings menu.

13. Select **Network**, press **ENT**.

14. Select **Sources**, press **ENT**.

15. Scroll to **Position**, press **ENT**.

16. Select **MXJB-NMEA3**, press **ENT** to leave a check mark.

17. Press the **CLR** key to exit.

18. Verify if position L/L is displayed in POS1 screen.
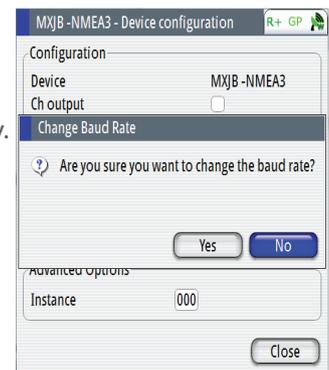
➔ *Notes:*

• If MXJB-NMEA3 (Port 3) is selected as position source the "Configure" button is not available. To configure Port 3, it has to be deselected first as source.

• Possible baud rates are 4800 or 19,200. When both antenna and J-Box port 3 are at the same baud rate (i.e. 4800), the J-Box sends a setup command to change the antenna baud rate to 19,200. Port 3 in turn switches itself to 19,200 baud automatically. If this fails to happen, you may have to manually reset the baud rate of the Port 3 of the junction box to 19,200 (see setting the antenna port baud rate for procedure).

- Group selection

  The GN70/MX610/MX612 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/MX610/MX612 system. If the group is set to "Simrad", any changes to a source will also affect other similar display systems on the network.

  If the group is "None", the selected source will be used for that particular GN70/MX610/MX612 unit only.

- Advanced selection

  This is similar to the manual selection mode. Using this mode will allow you to view all the available resources available in the N2K network. Selection can be done by placing a check mark on the item selected. You can only use one source of position at a time.
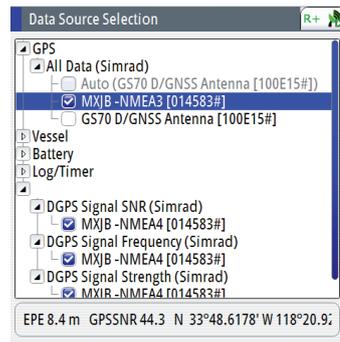
Device List

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. Press the **CLR** key to exit the data list screen.
8. Highlight the Close button and press the **ENT** key or press the **CLR** key several times to exit. You may also press any hot key to directly go to that screen.
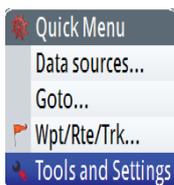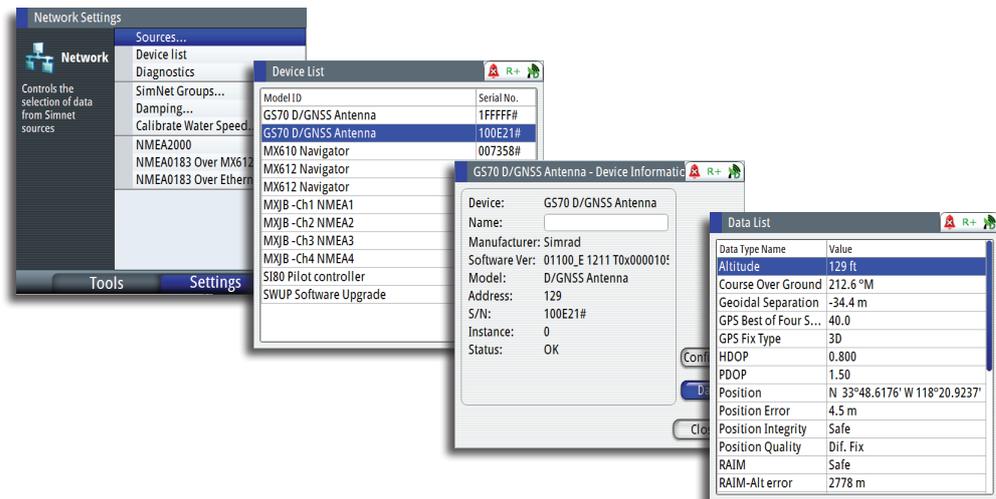
Changing BAUD rate

There are cases where you may need to change the baud rate speed of the NMEA 0183 port of the MX61xJB to match a NMEA "talker"or "listener". This can be done using the procedure below:

1. Press the **MENU** key.
2. Scroll to the "Tools and Settings", then press the knob or the **ENT** key.
3. Scroll to Network then press the **ENT** key.
4. Scroll to NMEA 0183 over MX61xJB then press **ENT**.
5. Scroll to the Port# desired (i.e. Port 1) then press ENT. The MXJB-Ch1 NMEA1 - Device Information dialog box will show.
6. The Configure button will be highlighted at this point, press the **ENT** key to activate the configure button.
7. Scroll to Baud rate... 4800, press **ENT**. The baud rate selections are 4800, 9600, 19200 and 38400.
8. Scroll to the correct baud rate then press **ENT** to accept.
9. Press the **CLR** key several times or press any hot key to exit.

Diagnostics

The diagnostic page shows details for the NMEA 2000/CAN bus network. This can be accessed under the Tools & Settings/Network menu.
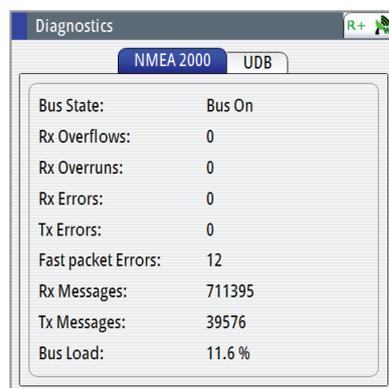
Option	Description
Bus State	Indicates if network backbone is operating. If no data is detected, check power and check the terminations
Rx Overflows	Value greater than 0 could indicate the software is very busy and unable to keep up with incoming messages
Rx Overruns	

Option	Description
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/MX610/MX612 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/MX610/MX612 display settings will also change. The third GN70/MX610/MX612 unit in the remote location which does not belong to group #1 will not be affected.
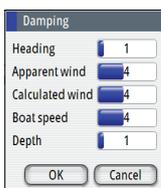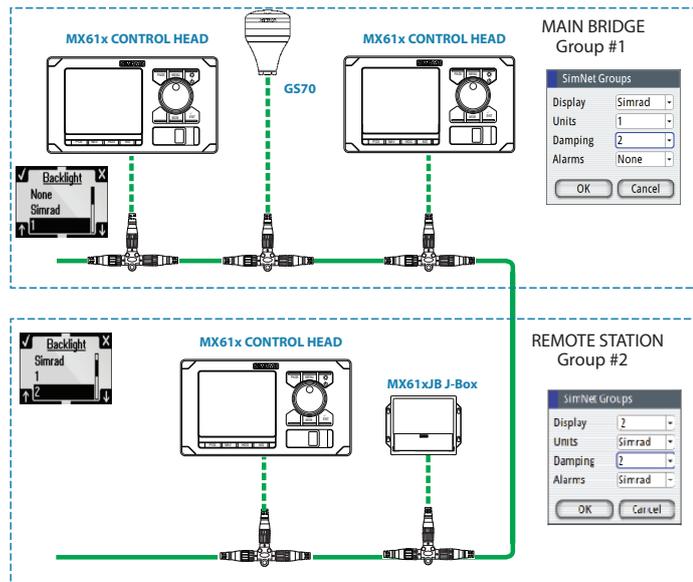
Damping

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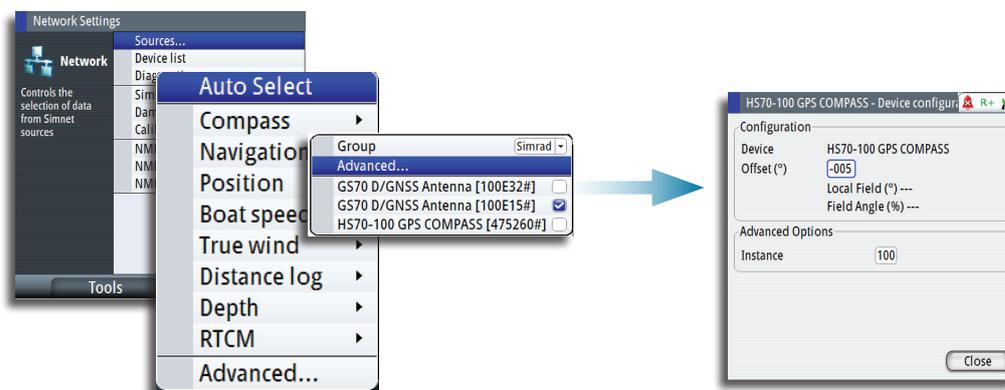
➔ *Note:* Make sure that both the compass heading and the bearing to the object have the same unit (Magnetic or True).

NMEA 0183 Output over TCP/IP (LAN)

The GN70/MX610/MX612 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"
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 and Angle

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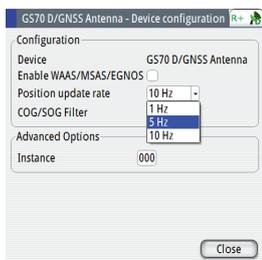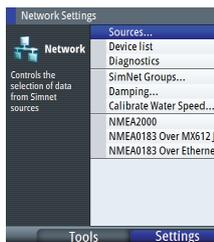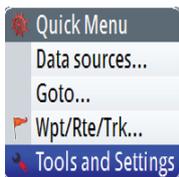
NMEA 0183 output over junction box

NMEA port selection is available only when a MX61xJB junction box is connected in the N2K network. The MX610JB has four RS-422 NMEA 0183 data ports while the MX612JB has twelve RS-422 NMEA 0183 ports. When the GN70/MX610/MX612 CDU senses the presence of the MX61xJB junction box, it will provide a list of port numbers based on the CDU model. Limit the number of NMEA messages to eight per port.

The junction box supplies the power used by devices connected to the NMEA 2000 bus.

When an MX smart antenna is connected in Ports 3 & 4 of the junction box and selected as source of position, port 3 will be grayed out in the list. The operator will be able to control ports 1 and 2 only for data output.

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. The MX610JB has 4 ports while the MX612JB has 12 ports.
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.
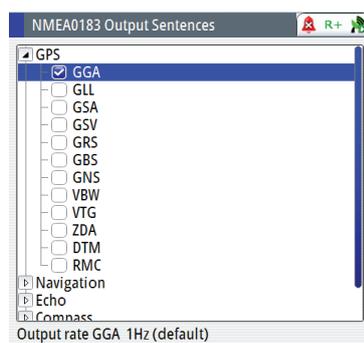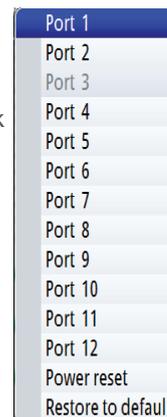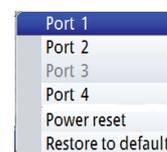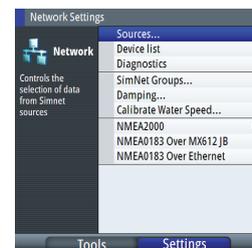
➔ Notes:

- A limit of eight (8) NMEA messages will be saved in the RAM memory of the MX610JB junction box NMEA when power is turned off. If this is exceeded, the NMEA 0183 messages will still be transmitted, however, when the junction box power is turned off , only the first 8 NMEA messages will be saved. The 9th and higher NMEA messages will be off the next time the power to the junction box is turned on.

- When an MX smart antenna (i.e. MX521A or MX575C) is connected to Port 3 of the junction box and selected as source of position, Port 3 will be grayed out from the list and will not be accessible to the operator until it is de-selected as source of position data.

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/MX610/MX612 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. Highlight 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 or 10 Hz. Select desired speed then press **ENT**.
7. Press the **CLR** button to go back to main menu.

GN70/MX610/MX612 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.

Determine the unit's software version

The About screen displays the copyright information, wheelmark icon and other technical information about the CDU model and MX antenna connected through the MX61xJB junction box. For devices connected through the NMEA 2000 network, the software version can be viewed using the device list.

CDU and Antenna software version:

1. Press the **MENU** key.
2. Scroll to **Tools & Settings**, press **ENT**.
3. Scroll to **Systems** icon, press **ENT**.
4. Scroll to **About**, press **ENT**. The system Model#, s/w version, Antenna model# and s/w version will be indicated
5. To exit, press the **CLR** key repeatedly or press any hot key.

All devices in the N2K Network:

1. Press the **MENU** key.
2. Scroll to **Tools & Settings**, press **ENT**.
3. Scroll to **Network** icon, press **ENT**.
4. Scroll to **Device List**, press **ENT**.
5. Scroll to the device to be verified, Press **ENT**.
6. Dialog box will show the software version and other technical data for that device.

GPS Settings

This settings screen allows the operator to control the RAIM feature, RAIM Alarm, RAIM protection radius, Lat/Long offsets, GNSS Mode and DGPS Mode. Use the procedure below to access this settings:

1. Press the **MENU** key to bring up the quick menu.
2. Select the Tools & Settings, press **ENT**.
3. Scroll to GPS icon, press **ENT**.
4. Scroll to RAIM or other features listed below.

RAIM Feature

RAIM (Receiver Autonomous Integrity Monitoring) is a fault detection feature that works in conjunction with the MX antenna unit. It gives the operator timely warnings when the GPS system error exceeds the pre-set limit of 100 meters. This feature requires at least five or more GPS satellite to operate properly. There are three RAIM states, namely:

- RAIM safe (R+) - system error is less than 100 meters
- RAIM unsafe (R-) - system error is equal or more than 100 meters
- RAIM caution (R?) - less than 5 satellites are available

The Enabled RAIM and RAIM alarm can be disabled by removing the check mark next to them. The RAIM protection radius can be either 10 or 100 meters. Default setting is 100 meters.

Lat/Long Offset

This feature allows the operator to enter the Latitude and Longitude offset values between the center of the ship to antenna position.

GNSS Mode

Depending on the antenna type in use, the operator can select whether the position Lat/Lon will be determined using autonomous GPS satellites only or combination of GPS and GLONASS satellites. The GPS+GLONASS selection becomes available only when the MX521B or MX575D/HS80A antenna model is in use.
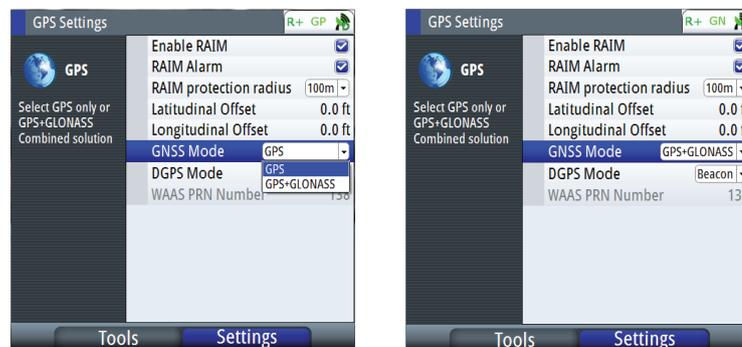
Autonomous GPS position fix is indicated by a "GP" icon in the status bar while GPS+GLONASS is indicated by "GN" icon.

GPS/GLONASS selection

By default, the SIMRAD CDU is set to navigate using the GPS satellite system. When using the MX521B smart antenna or the HS80A/MX575D smart D/GPS compass models, the SIMRAD CDU can be controlled to navigate using combined solutions from GPS and GLONASS satellites.

Setup procedure to use GPS and GLONASS (or GNSS) satellites:

1. Press the **MENU** key.
2. Scroll **Tools & Settings** menu, press **ENT**.
3. Scroll to **GPS** icon, press **ENT**.
4. Scroll to **GNSS Mode,** press **ENT**.
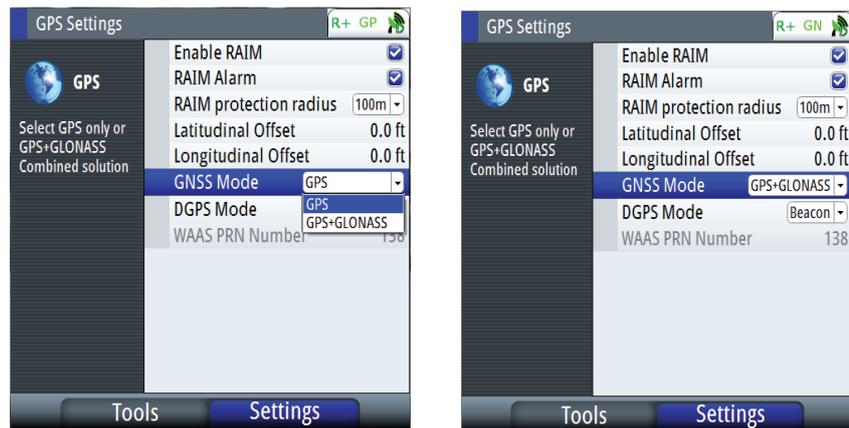
5. Scroll to **GPS+GLONASS**, press **ENT**.
6. Press the **CLR** key repeatedly (or press any hot key) to exit.
7. The GP (GPS) icon in the status bar will change to GN when position solution from combined GPS & GLONASS becomes available.

DGPS Mode

The DGPS mode controls the implementation of DGPS corrections to the GPS receiver. The three differential modes are Off, WAAS and Beacon. WAAS is also known in general term as SBAS (Satellite Based Augmentation System). This includes EGNOS, MSAS and other satellite based GPS correction systems implemented by host countries. SBAS correction is not recognized by IMO and should not be used in lieu of the land-based differential station signals. It is recommended to turn the DGPS mode to OFF when navigating in areas where the land-based differential beacon signals are not available.

The source of DGPS corrections can be controlled using the procedure below:

1. Press the **MENU** key.
2. Scroll to **Tools & Settings** menu, press **ENT.**
3. Scroll to **GPS** icon, press **ENT.**
4. Scroll to **DGPS mode**, press **ENT.**
5. Scroll to OFF, Beacon or WAAS, press **ENT.**
6. Press any hot key to exit.
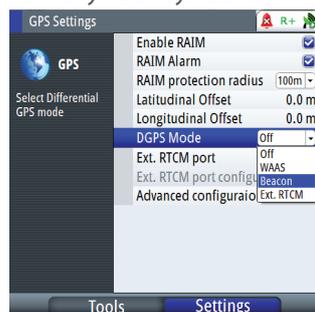
Reset Procedures

In order to access the RESET functionality, the following software versions have to be in place:

- GN70/MX61x CDU - s/w version 1.0.42.235 (or newer),
- MX61xJB junction box - s/w version 1100 100121 (or newer)

How to RESET the Junction Box: (MX610JB & MX612JB)
1. Press the **MENU** key.
2. Scroll to **Tools & Settings**, press **ENT**.
3. Scroll to **NETWORK**, press **ENT**.
4. Scroll to "**NMEA Over MX61xJB**", press **ENT**.
5. Scroll to either "**Restore to Default**" or "**Power Reset**", press **ENT**.
6. Press the **CLR** key repeatedly or press any hot keys to exit.
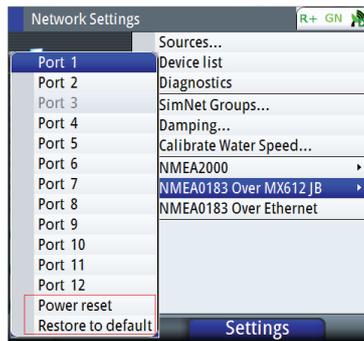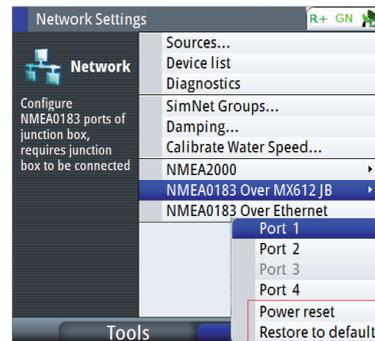
MX612 with 12 Ports   *MX610 with 4 Ports*

Where:

- Power Reset - cycles the power to the junction box. No change to baud rate of ports.

- Restore to default - restores baud rate of ports as per the table below.

Port#	MX610	MX612	Description
MXJB-NMEA1	4800	4800	NMEA 0183
MXJB-NMEA2	4800	4800	NMEA 0183 Out & RTCM Inport
MXJB-NMEA3*	19,200	19,200	NMEA 0183 - Antenna Port
MXJB-NMEA4	4800	4800	NMEA 0183
MXJB-NMEA5	-	4800	NMEA 0183
MXJB-NMEA6	-	4800	NMEA 0183 Out & RTCM In port
MXJB-NMEA7*	-	19,200	NMEA 0183 - manually set to 4800 after restoring to default
MXJB-NMEA8	-	4800	NMEA 0183
MXJB-NMEA9	-	4800	NMEA 0183
MXJB-NMEA10	-	4800	NMEA 0183 Out & RTCM In port
MXJB-NMEA11*	-	19,200	NMEA 0183 - manually set to 4800 after restoring to default
MXJB-NMEA12	-	4800	NMEA 0183

→ ***Note**: Restoring to default causes the baud rate of Port 3 to match the antenna baud rate at 4800 baud. When the antenna is detected, it will automatically configure the antenna to 19,200 and then adjust itself to 19,200 after 5 seconds. This action is duplicated in ports 7 and 11. Please remember to set the ports 7 and 11 back to 4800 manually so they can be used as regular NMEA 0183 port.

How to RESET the SIMRAD Antenna: (MX521, MX521A, MX521B, HS80A, MX575C & MX575D)

1. Press the **MENU** key.

2. Scroll to **Tools & Settings**, press **ENT**.

3. Scroll to **GPS** icon, press **ENT**.

4. Scroll to **Antenna Reset** menu, press **ENT**.

5. Select **Cold Reset** or **Factory Default**, press **ENT**.

   Where:

- Cold Reset - sets the baud rate to 4800, NMEA messages to default and clears the oscillator, ephemeris and almanac data

- Factory Default - sets the baud rate to 4800 and sets the NMEA messages to default
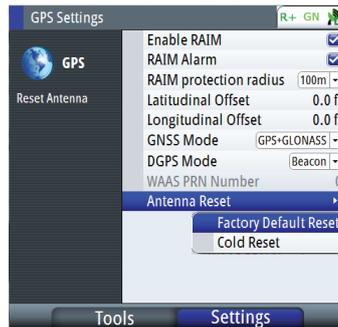
➔ *Note:* Resetting the antenna will automatically change the baud rate of the antenna and the MX61xJB port 3 to 4800 baud. When normal communication between the MX antenna and the Junction box is restored, they both will usually go back to 19200 baud without user intervention. Normal operation of the system will be restored after 90 seconds.

How to restore the MX61x display to default settings:

1. Press the **MENU** key.

2. Scroll to **Tools & Settings**, press **ENT**.

3. Select **SYSTEMS** icon, press **ENT**.

4. Scroll to **Systems Defaults**, press **ENT**.

5. Place check mark on each item you want to reset by scrolling to it and pressing the **ENT** key.

6. Scroll to the **OK** button and Press **ENT**.

7. The MX61x CDU will restart.

8. Press the **PWR** key and hold it down until it beeps. Press the power key momentarily to stop the beeping.

9. Turn the power ON by pressing the power key momentarily.
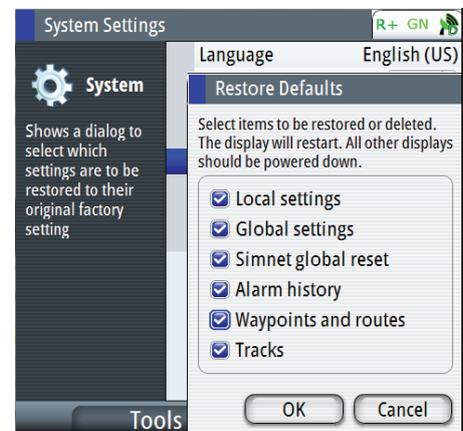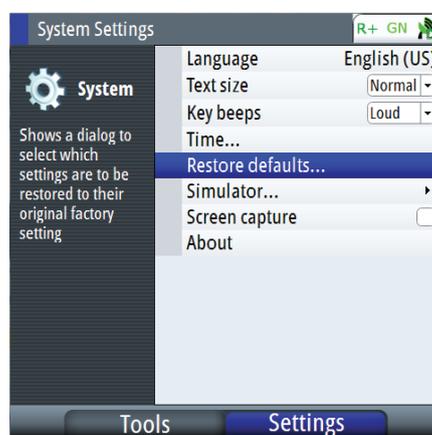
Settings will be deleted or set to default when checked:

- Local settings - local display settings will be restored to default
- Global settings - global group settings will be restored to default
- SimNet global reset - Reset the SimNet network.
- Alarm history - all alarms logged will be deleted
- Waypoints and routes - all waypoints and routes will be deleted
- Tracks - all tracks will be deleted

→ **Note**: Unless you need to clear all stored values during the installation setup procedure, you should not perform a restore to factory settings.

24-Hour HDOP History

This screen presents a bar graph representing the HDOP for the past 23 hours.   The GPS constaellation shifts back 4 minutes per day. That means you can expect the GPS coverage to be virtually the same today as it was yesterday.The small 1 hour gap in the bar graph represents the 24th hour. The gap is provided to ease the readability of the graph for the present time. To bring up the HDOP history screen, do the following:

1. Press the **MENU** key.
2. Scroll to **Tools & Settings**, press **ENT**.
3. Scroll to **GPS** icon, press **ENT**.
4. Press the PAGE key to change tab to HDOP.
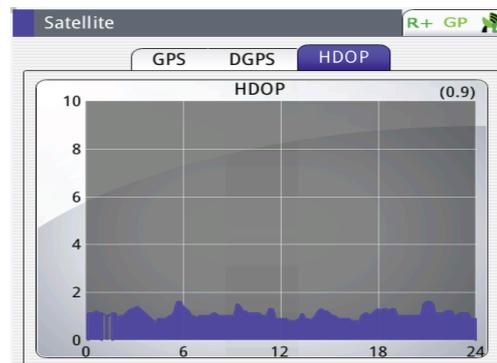
12 Maintenance

Preventive maintenance

The GN70/MX610/MX612 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. Crystallized 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/MX610/MX612 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 MX610/MX612 unit.

Unit fails to detect the antenna	For N2K antenna models (GS70 or HS80):
	Make sure the 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/Sources page.
	Make sure N2K terminators are used on both ends of the NMEA 2000 bus.
	For MX521A or MX575C/D antennas connected to Port 3 of the MX61xJB, check the following: 1. Port 3 of the MX61xJB is configured to match the baud rate setting of the MX antenna (4800 (or 19,200). 2. The MXJB Port 3 is selected as the source of position under the MENU/Data sources/Position.. 3. Check the wiring for proper connections (see installation wiring section)
	If problem persist, replace the antenna unit.
True Heading is not displayed	Verify if the source of data is the HS70/HS80/MX575C or Gyro is selected under the MENU/Data sources/Compass. 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. Press and hold down the power button for 5-6 seconds to turn off the unit completely. Repower by pressing the power key thereafter.
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(s) and connectors 3. Replace N2K power supply or MX61xJB junction box 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

Software upgrade of the MX610/MX612 display unit and MX61xJB junction box can be accomplished using USB memory stick or a PC. The GN70 software upgrade can only be done using a PC.

The latest software files for the GN70/MX610/MX612 and junction box can be downloaded from the SIMRAD professional web site;
www.simrad-yachting.com

MX610/MX612 CDU software update procedure (USB method)

1. Copy the *.upd file to a USB memory stick.
2. Insert the USB stick into the MX61X USB connector.
3. Turn off the MX61x unit by pressing the power key for a few seconds until the beeper sounds.
4. Turn the power on by pressing the power key momentarily . The s/w update will start automatically.
5. At the end of the programming procedure, remove the USB memory stick.
6. Turn ON the unit.
7. Verify the software version number by pressing the **MENU** key.
8. Scroll down to **Tool & Settings** menu, press **ENT**.
9. Select the **Systems** icon, press **ENT**.
10. Scroll to **About**, press **ENT**.
11. End of procedure.

MX61xJB junction box software update procedure using the MX61x display (USB method)

This programming feature is available in MX610/MX612 CDU with s/w version V1.0-42.226 or newer. Program update of the junction box can be done through the display USB.

1. Copy the junction box software file (*.swup) to a USB memory stick.
2. Restore the junction box to default using the below procedure:

   a. Press the MENU key.

   b. Scroll to Tools and Settings, press ENT.

   c. Select Network, press ENT.

   d. Scroll to NMEA 0183 over MXJB, press ENT.

   e. Select Restore to Default, press ENT.

3. Insert a USB memory stick loaded with the MXJB *.swup file.
4. Press the **USB** key.
5. Scroll to "**Memory Card - USB**", press **ENT**.
6. Scroll to **MXJB 1_0_01_20.swup** file (or newer version), press **ENT**.
7. Select the **Upgrade** button, press **ENT**.
8. Put a check mark on the "**SI80 Pilot controller [00xxxx#]**" or "**MXJB NMEA0183 gateway [00xxxx#]**" device in the list. The MX612JB has three of these, please put a check mark one at a time starting at the gateway or controller with S/N [003xxx].
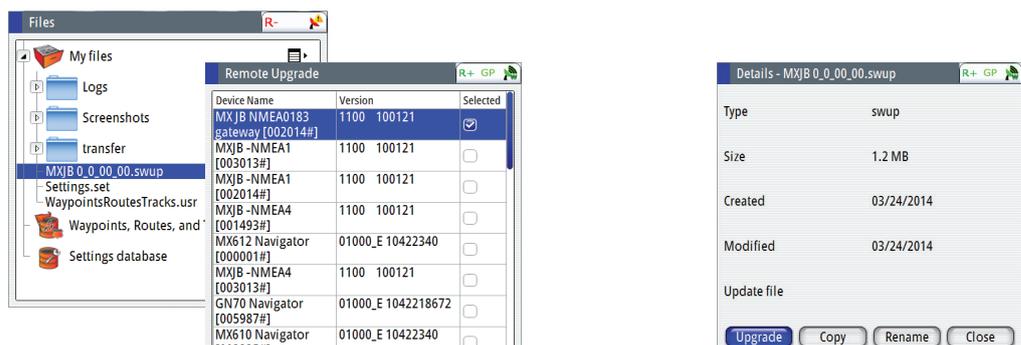
9. Press the **MENU** key, then choose Start Upgrade, press **ENT**.

10. Answer YES on the dialog box.

11. After a few seconds the progress meter will indicate the status of download.

12. Repeat the process for gateway number [002xxx#], then finish with the programming with the board s/n [001xxx#].

13. Remove the USB.

14. Verify the software version under the Menu/Tools & Settings/Network/Device List.

➔ *Notes:*

• It is important that the three MXJB gateways (or SI80 Pilot Controller) of the MX612 be programmed one at a time to prevent conflicts.

• Upgrading the MX610JB/MX612JB junction box software through the USB port of the MX61x CDU (or via PC for GN70) may require an external 12 VDC supply to the NMEA 2000 bus (see the diagram below). Software update of the junction box may fail if no external 12 VDC is applied.
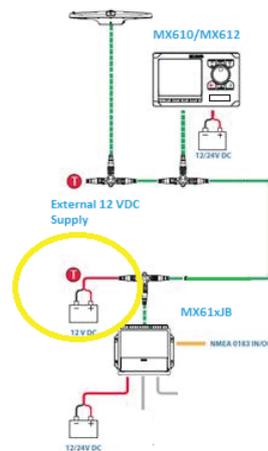
GN70/MX61x Software Update Procedure using a PC

1. Copy the *.upd file to your PC (not a network location).

2. Connect the GN70/MX61x directly to your computer with a LAN network cable.

3. Completely cut the 12-24 VDC power to the MX61x unit by using the power supply switch or circuit breaker.

4. Press and hold down the **PAGE** button (top left button above the rotary) and apply external power to the unit.

5. Launch the Internet Explorer (or other web browser) and type the address as shown on the MX61x (i.e. http://192.168.0.1).

6. Browse to the file on your PC.

7. Click on upload.

8. The display unit will start the update process automatically after the upload.

9. End of procedure.
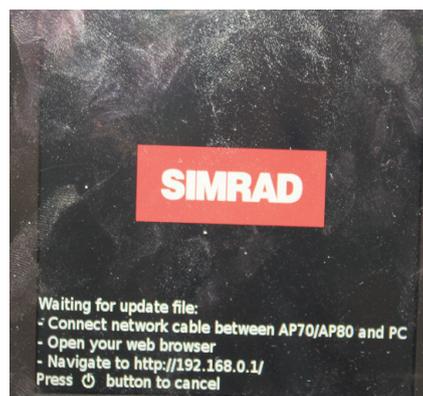
13 List of components

The tables below list parts that are included in MX610/MX612 GPS and DGPS navigation kits. as well as optional items such as, cables and accessories that are available from your dealers.

MX610 DGPS navigation system (P/N 000-10919-001)

Part Name	Qty	Part number
MX610 Display Unit	1	000-10914-001
Operator and Installation Manual	1	988-10370-001
Quick Guide	1	988-10369-001
Power Cable Assembly	1	032-0055-88
Mounting Template	1	988-10200-002
Mounting kit	1 bag	003-8520-00
Mounting gasket	1	074-1114-000
Cable Assy, 6M N2KExt-BLK	1	003-8634-00
Micro-C, T-Connector	1	037-0491-01
MX610JB Junction Box	1	000-11139-001
MX521A DGPS antenna	1	727051

MX610 GPS navigation system (P/N 000-10917-001)

Part Name	Qty	Part number
MX610 Display Unit	1	000-10914-001
Operator and Installation Manual	1	988-10370-001
Quick Guide	1	988-10369-001
Power Cable Assembly	1	032-0055-88
Mounting Template	1	988-10200-002
Mounting kit	1 bag	003-8520-00
Mounting gasket	1	074-1114-000
Cable Assy, 6M N2KExt-BLK	1	003-8634-00
Micro-C, T-Connector	1	037-0491-01
MX610JB Junction Box	1	000-11139-001
MX521A GPS antenna	1	727050

MX612 DGPS navigation sytem (P/N 000-10923-001)

Part Name	Qty	Part number
MX612 Display Unit	1	000-10915-001
Operator and Installation Manual	1	988-10370-001
Quick Guide	1	988-10369-001
Power Cable Assembly	1	032-0055-88
Mounting Template	1	988-10200-002
Mounting kit	1 bag	003-8520-00
Mounting gasket	1	074-1114-000
Cable Assy, 6M N2KExt-BLK	1	003-8634-00
Micro-C, T-Connector	1	037-0491-01
MX612JB Junction Box	1	000-10916-001
MX521A DGPS antenna	1	727051

MX612 GPS navigation sytem (P/N000-10921-001)

Part Name	Qty	Part number
MX612 Display Unit	1	000-10915-001
Operator and Installation Manual	1	988-10370-001
Quick Guide	1	988-10369-001
Power Cable Assembly	1	032-0055-88
Mounting Template	1	988-10200-002
Mounting kit	1 bag	003-8520-00
Mounting gasket	1	074-1114-000
Cable Assy, 6M N2KExt-BLK	1	003-8634-00
Micro-C, T-Connector	1	037-0491-01
MX612JB Junction Box	1	000-10916-001
MX521A GPS antenna	1	727050

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 MTR	000-10816-001
CZONE, NMEA 2000 EXTENSION 2.0 MTRS	000-10817-001
CZONE, NMEA 2000 EXTENSION 5.0 MTR	000-10814-001
CZONE, NMEA 2000 EXTENSION 10 MTRS	000-10815-001

Optional accessory items for N2K network

Part Name	Part number
Protective cover (White)	000-10596-001
Optional bracket mounting kit	000-10590-001
MX610JB Smart junction box	**000-10425-001**
MX612JB smart junction box	000-10916-001
AT10 N2K to NMEA Converter	**24005936**
Cable, Micro-C, Metal, 0.4m	000-10396-001
Cable, Micro-C, Metal, 2m	000-10397-001
Micro-C, Metal, 5m	000-10398-001 Cable
Cable, Micro-C, Metal, 9m	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**
N2K-EXP-KIT,MICRO-C,STARTER KIT	**000-0124-69**

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!

MX61x navigation system; basic wiring principles

The MX610 or MX612 navigation system is comprised of the MX61x display unit, MX61xJB junction box and MX521A smart D/GPS antenna unit. The MX61x display use CAN bus backbone which makes it simple to interface to SimNet and other NMEA 2000 (N2K) devices. The 12-Volt DC power to the CAN bus can be supplied through a T-Connector or by the junction box.

NMEA 0183 devices such as the MX521A DGPS smart antenna, autopilots, radar and PC-based ECDIS can be interfaced using the MX61xJB smart junction box.

In systems with the MX61xJB junction box the CAN bus is powered by the junction box. The MX610/MX612 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.
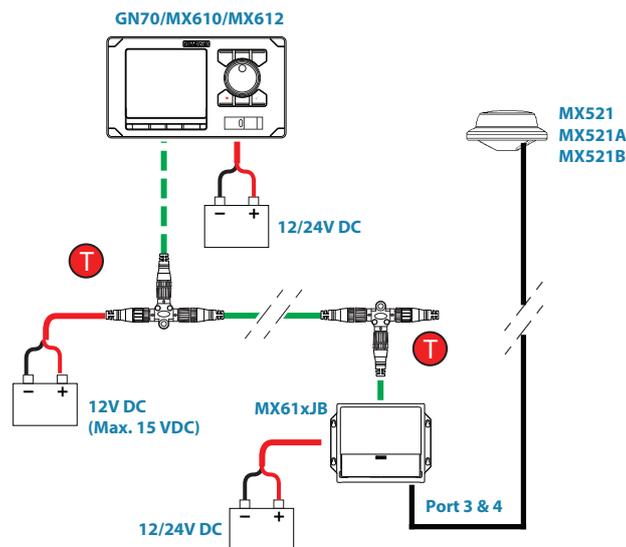
MX61x with MX521 antenna and junction box wiring diagram

➔ *Note:* The MX521A antenna is connected to ports 3 and 4 of the junction box .

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 MX610/MX612 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.
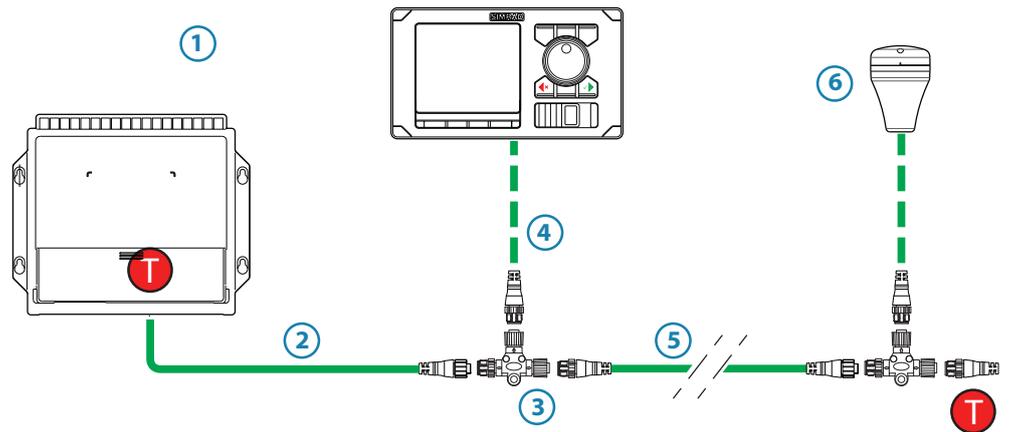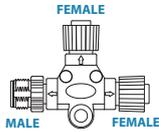
FEMALE

MALE **FEMALE**

MX610/MX612 with MX610 junction box wiring diagram

No.	Description
1	MX610JB (or MX612JB) junction box with built-in CAN bus terminator and network power supply
2	0,6 m (2 ft) pigtail cable, female connector
3	Micro-C T-joiner
4	CAN bus drop cable, with connectors in each end (female - male) - (6 meter max)
5	CAN bus Backbone, various lengths available. Connectors in each end
6	Optional 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 MX610/MX612 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 junction box 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

→ *Notes:*

- Wheelmark/US Coast Guard approved systems require a Power Failure alarm. In such installations the MX610/MX612 and the MX610JB must be connected to different independent power supplies.
- It is recommended to install an external on/off switch or circuit breaker for the Junction Box power supply.
- Do not connect the power cable to the same terminals as the start batteries, drive units, thruster or other high current products.
- 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.
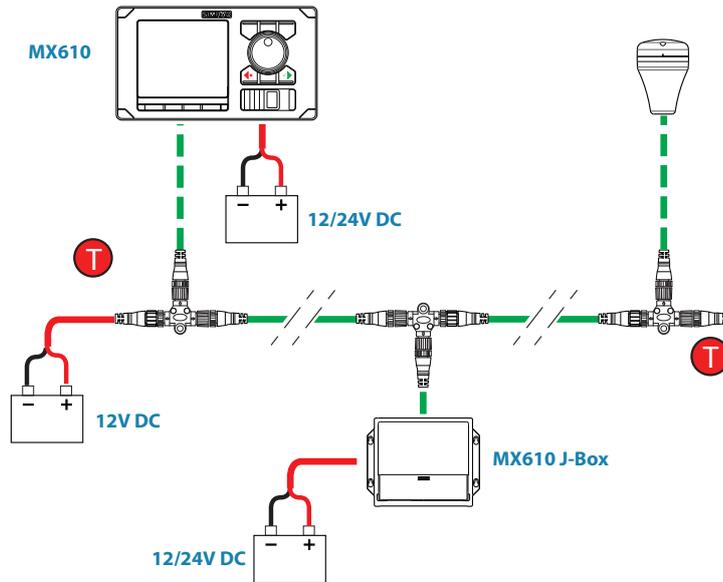
N2K power diagram

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.
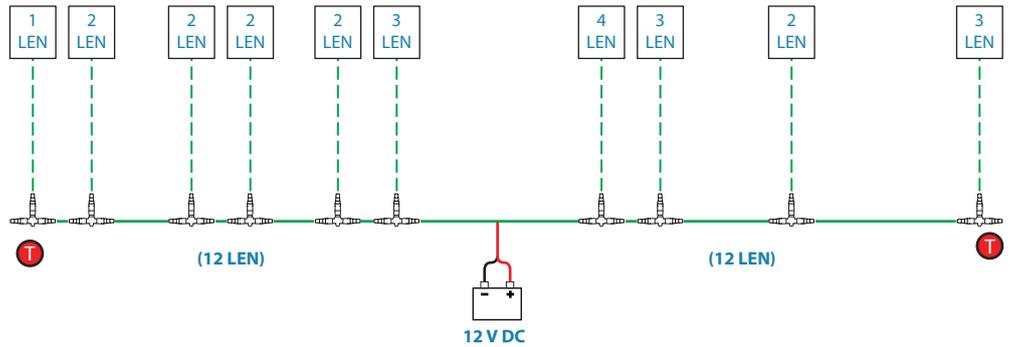
N2K system with balance load

Powering the MX610/MX612 display units

The MX610/MX612 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.
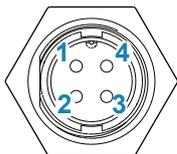
Pin	Color	Description
1	Black	Battery (-)
2	Blue	External Alarm
3	Yellow	External MOB
4	Red	Battery (+), 12 - 24 V DC

➔ *Notes:*

• 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.
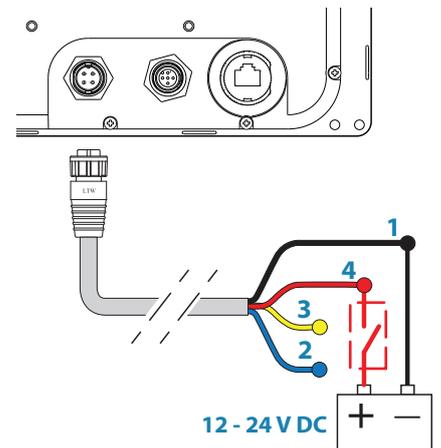
NMEA 2000 and SimNet devices

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
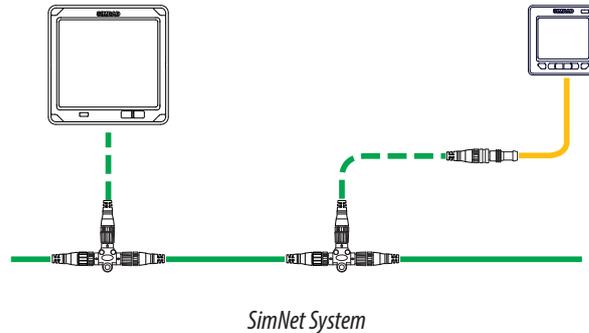
IEC61162-1/2 (NMEA 0183) Devices

Connects to: MX61xJB board (in MX61xJB computer).

The MX610JB board includes 4 NMEA Port terminals, while the MX612JB unit has 12 NMEA port terminals.

NMEA 0183 wiring hookup to MX61xJB
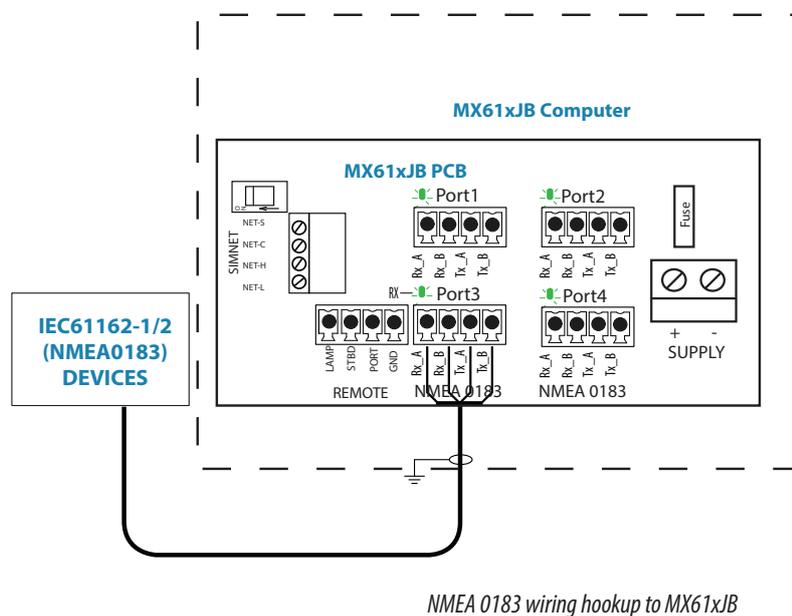
RX1 The green LED at each NMEA port terminal will flash when serial data is received.

The MX61xJB board uses the serial RS422 (IEC 61162-1/2) standard and can be configured in the MX610/MX612 display for different baud rates, up to 38,400 baud (default baud rate is 4800). Sentence output by the MX610/MX612 can be individually turned on or off. The default NMEA sentence setting is off.

➔ **Note:** Limit the number of NMEA messages turned on to eight (8) per port. Although the junction box allows you to turn on more than eight and will output all messages you turn on, the MX61x JB memory can only retain up to 8 messages per port when power is turned off.

Connecting the MX61xJB computer to the N2K bus

The MX61xJB smart junction box can connect anywhere on the N2K bus back bone by using drop cables connected to the SIMNET connector and a female connector on the Micro-C T-joiner.

Drop cables of varying lengths can be purchased from local SIMRAD dealers.
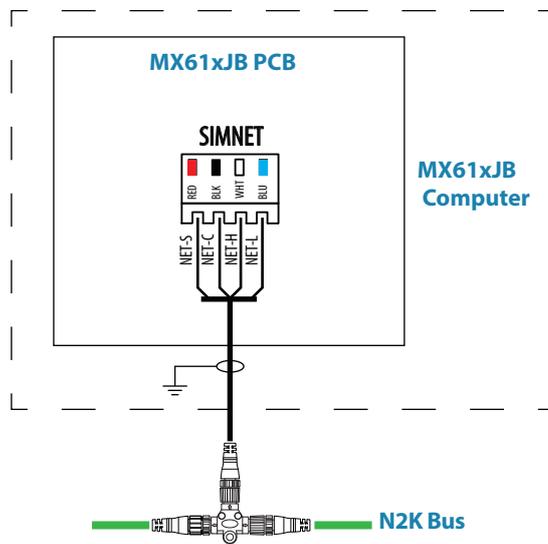
MX61xJB connection to NMEA 2000 Bus

Alarm interface

External alarm

An external alarm can be connected to the MX610/MX612 display unit. The alarm signal has 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.
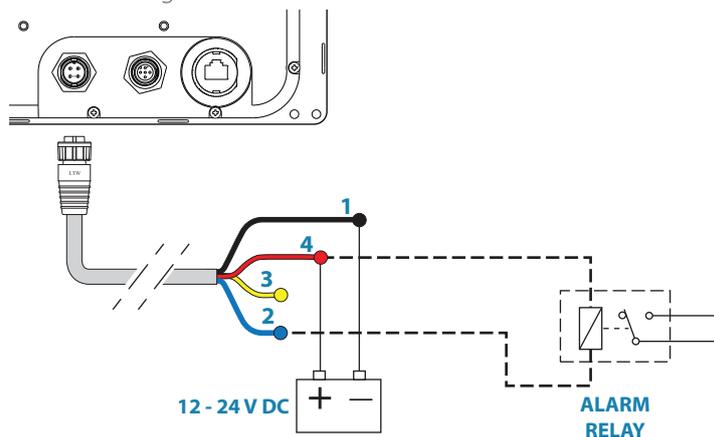
External alarm connection
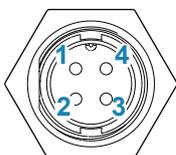
Pin	Color	Description
1	Black	Battery (-)
2	Blue	External Alarm
3	Yellow	External MOB
4	Red	Battery (+), 12 - 24 V DC

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.
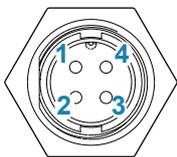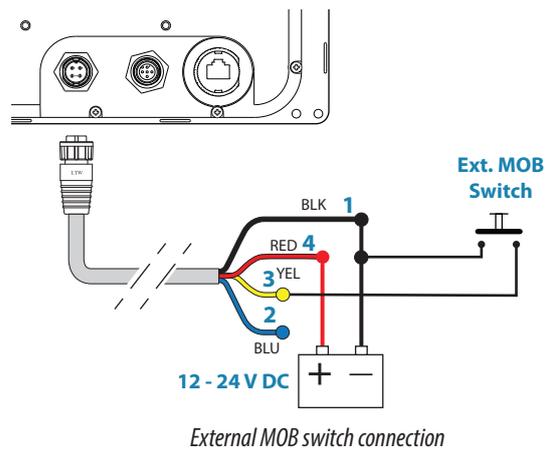
External MOB switch connection

Pin	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 36.

From the MX610/MX612 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.
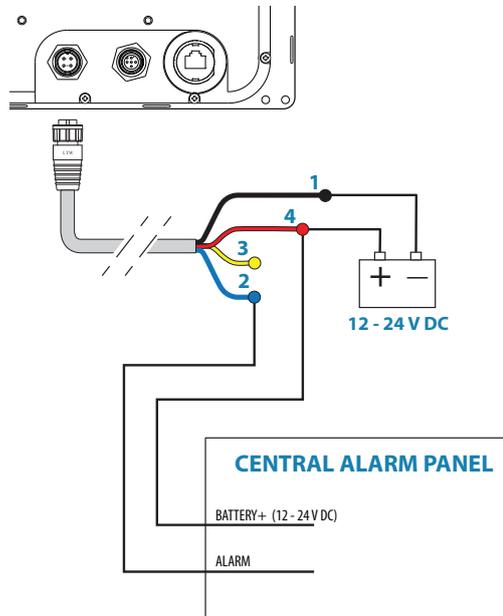
External alarm wiring Connection
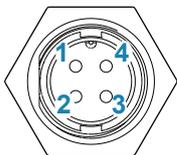
Pin	Color	Description
1	Black	Battery (-)
2	Blue	External Alarm
3	Yellow	External MOB
4	Red	Battery (+), 12 - 24 V DC

MX610/MX612 with MX521A smart antenna and MX525A sensor connections

MX61x

MX521
MX521A
MX521B

Option

MXB5 ANT.

12/24V DC

Coax Cable

MX525 MX525A

MX61xJB

12/24V DC

Ports 3&4

Port 1

Port 2

Where:

——— N2K Backbone

– – – Drop line

——— NMEA 0183 line
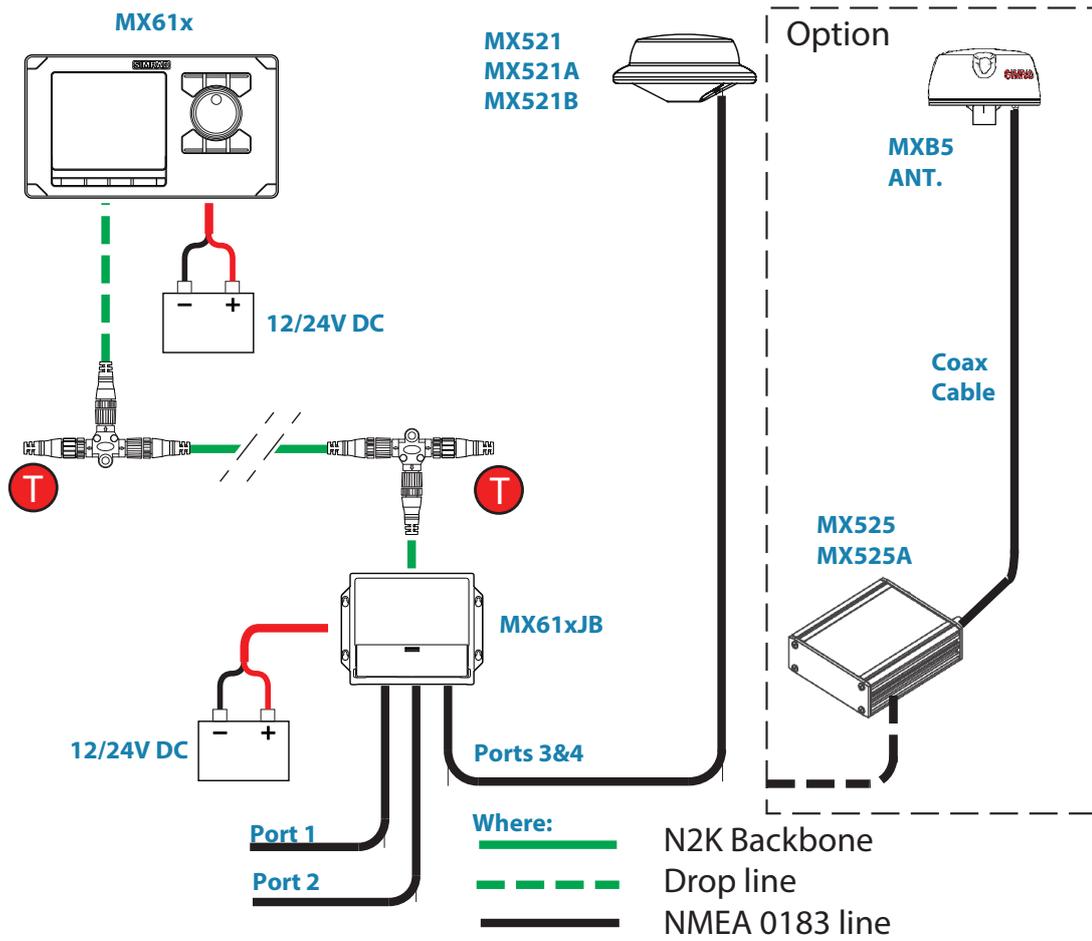
MX610, MX610JB junction box and MX521/MX525 diagram

MX610

GS70 Antenna

12/24V DC

12V DC

MX610JB

12/24V DC

P2

EXT. RTCM @9600 Baud

P2

RX+ RX– TX+ TX–

Plug-in Conn.

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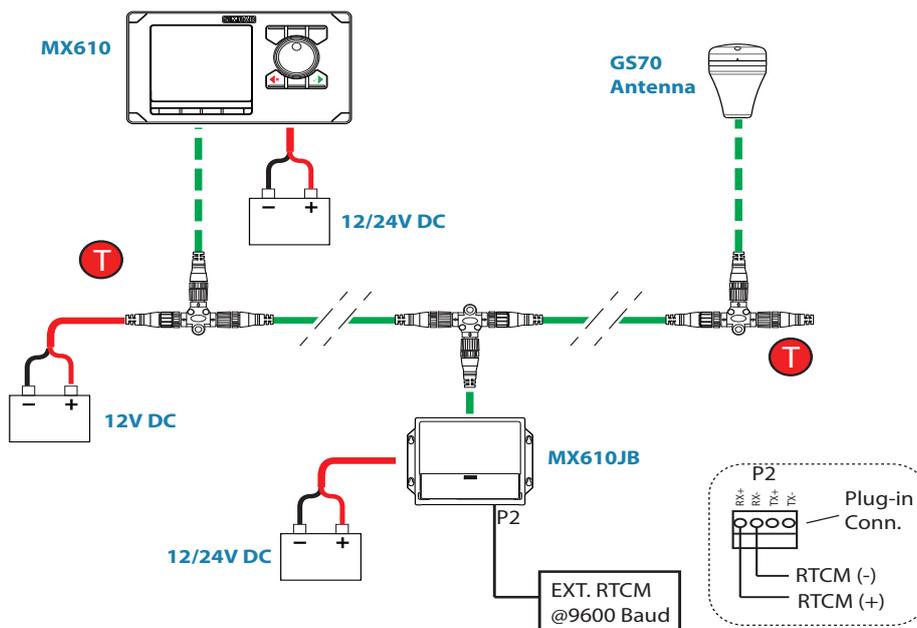
External Differential Correction connection to GS70 though the MX610JB junction

MX61xJB PCB Terminals

MX521A

ANTENNA CABLE

SIMNET

TERMINATION

SIMNET

PORT1   PORT2

REMOTE   PORT3   PORT4   SUPPLY

NMEA 0183 PORT
CONNECTOR TERMINALS

RX+ RX- TX+ TX-

RED
BLK

NEG
12-24 VDC (+)
GRY
PRPL
YEL
WHT
BLU
BRN
ORG
GRN

MX521 to MX61xJB wiring Diagram

MX61xJB PCB Terminals

MXB5

COAX ANTENNA CABLE

MX525A

SIMNET

TERMINATION

SIMNET

PORT1   PORT2

REMOTE   PORT3   PORT4   SUPPLY

NMEA 0183 PORT
CONNECTOR TERMINALS

RX+ RX- TX+ TX-

RED
BLK

NEG
+12-24 VDC
GRY
PRPL
YEL
WHT
BLU
BRN
ORG
GRN

3-Meter
Power/Data Cable
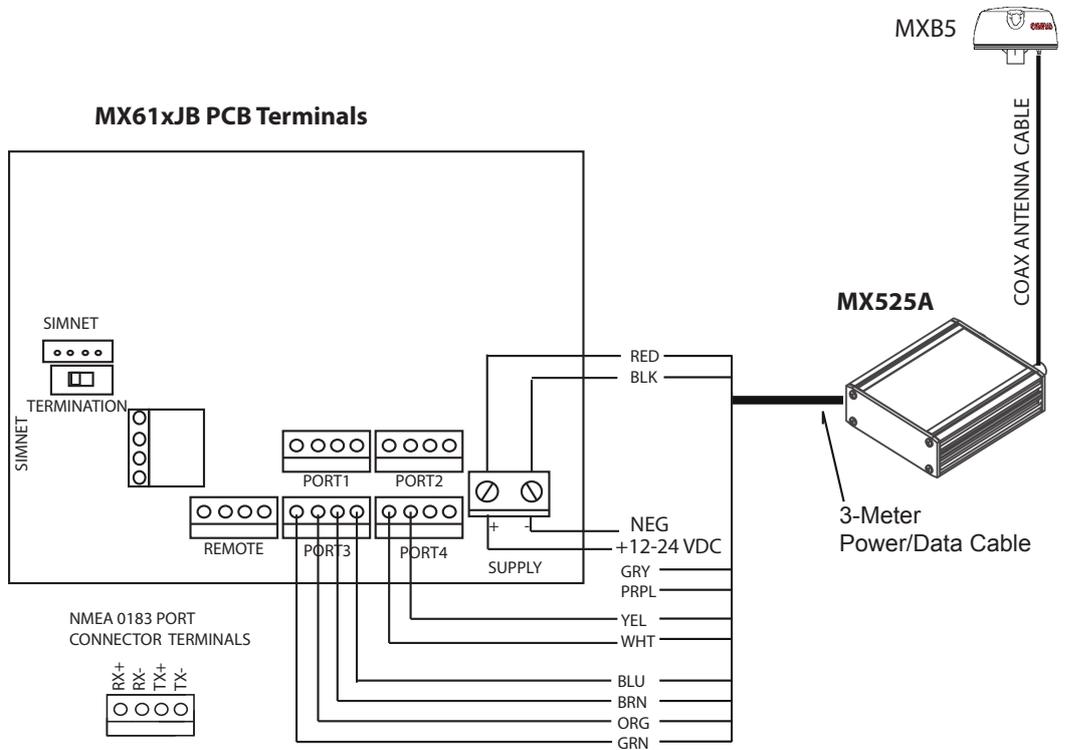
MX525A to MX61x JB wiring diagram

MX575C/MX575D
GPS Compass

MX610

12/24V DC

T   T

MX610JB

12/24V DC

Ports 3&4

Port 1

Port 2

Where:

N2K Backbone

Drop line

NMEA 0183 line
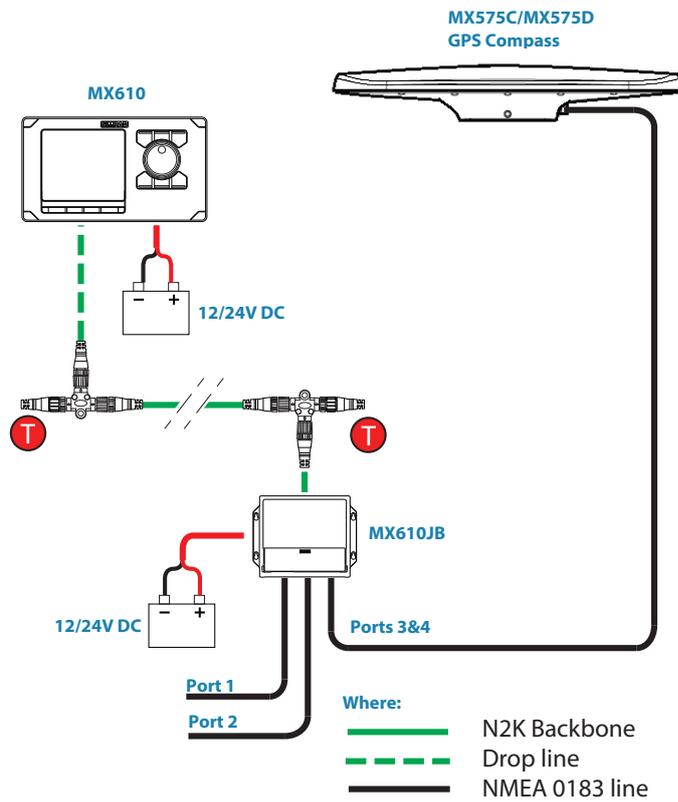
MX610/MX612 system with MX575C GPS compass diagram

MX575C
GPS Compass

N2K

MX610JB PCB Terminals

ANTENNA CABLE
051-0289-000#(A2)

SIMNET

TERMINATION

SIMNET

RED
BLK
WHT
BLU

PORT1   PORT2

Gyro TX+
Gyro TX-

RED
BLK

NEG
12-24 VDC

+   -

REMOTE   PORT3   PORT4   SUPPLY

Speed Log+

Speed Log -

GRN
BLK/GRN
BRN
BLK/BRN
YEL
YEL/BLK

NMEA 0183 CONNECTOR
TERMINALS

RX+ RX- TX+ TX-
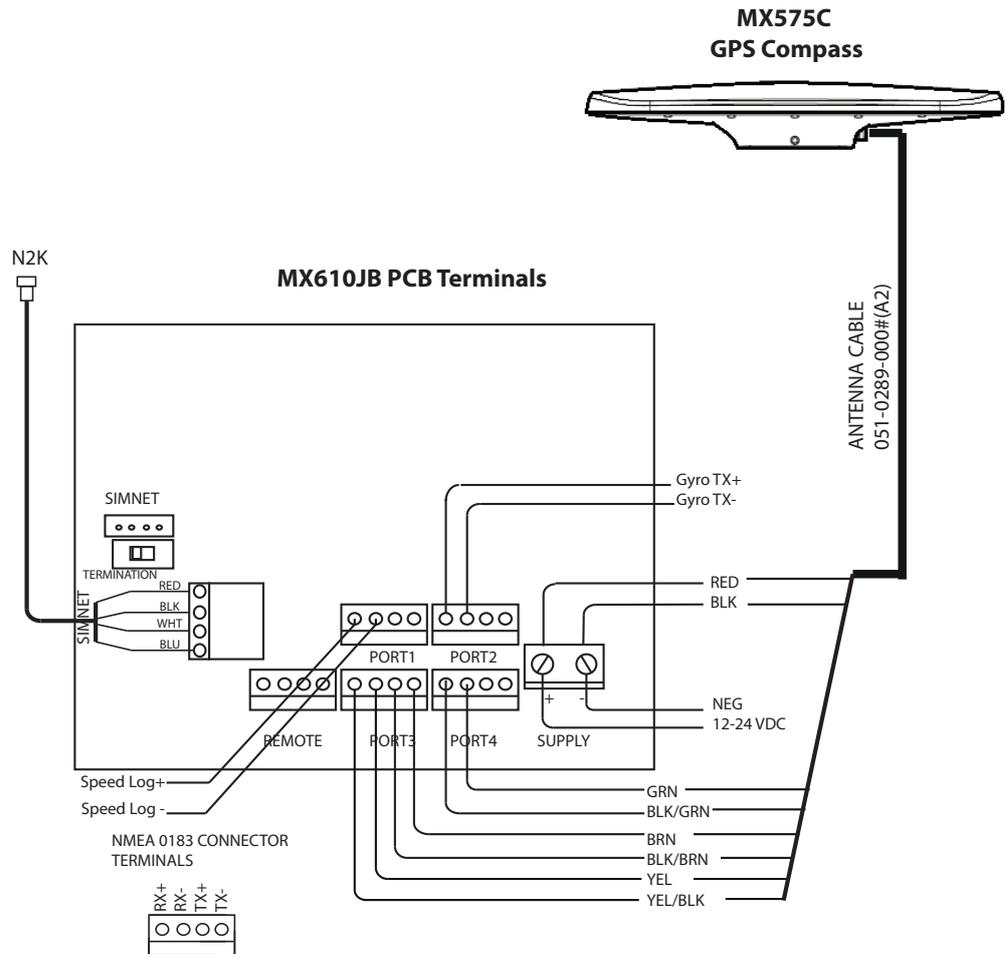
NMEA 0183 connection of the MX575C to MX610JB wiring diagram
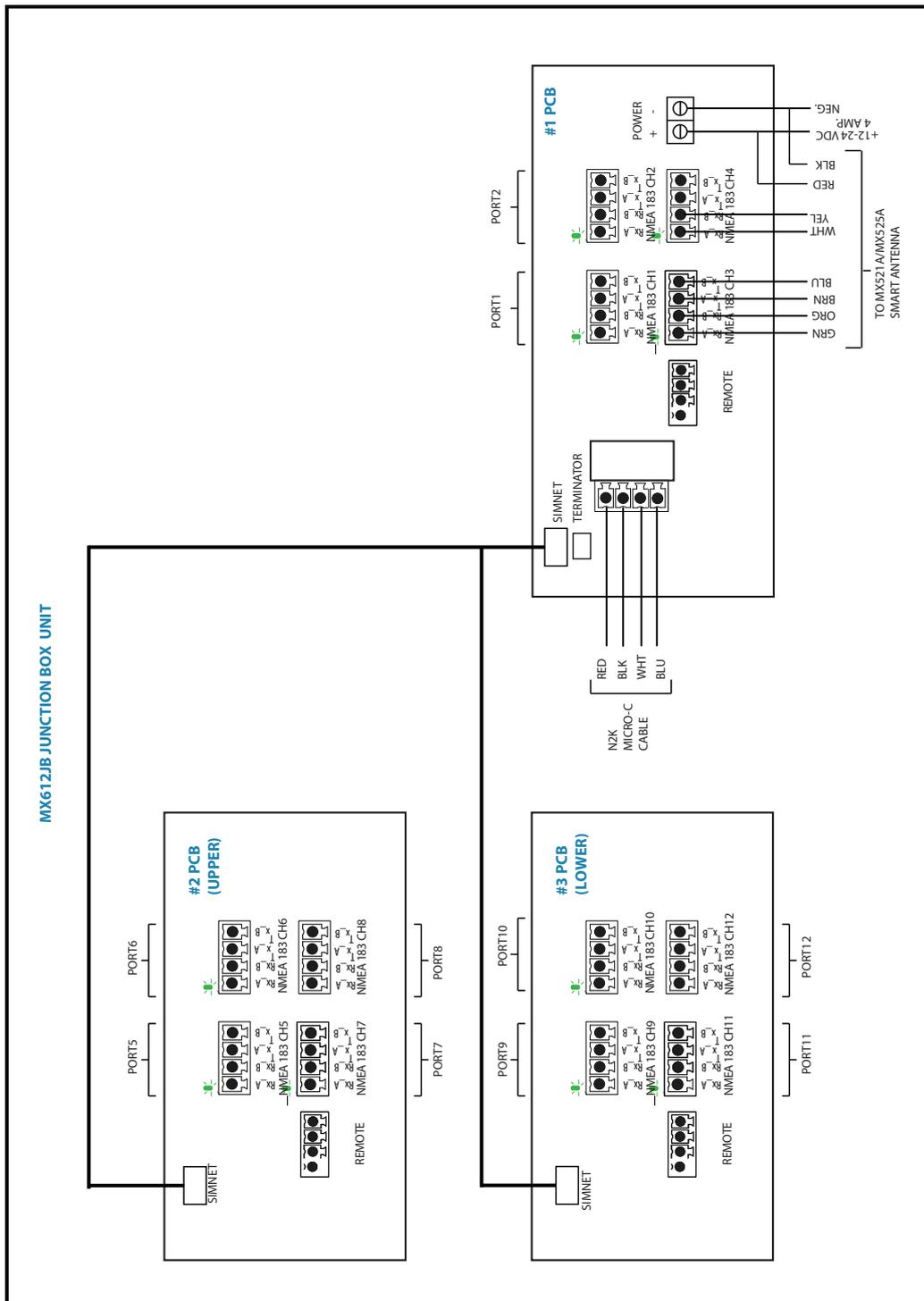
MX612JB junction box antenna connection

HS80/HS80A

GN70/MX610/MX612

12/24V DC

MX61xJB
Junction Box

12/24V DC

Ports 4
Ports 3
Port 1
Port 2

Where:

—————— N2K Backbone
- - - - - - Drop line
—————— NMEA 0183 line
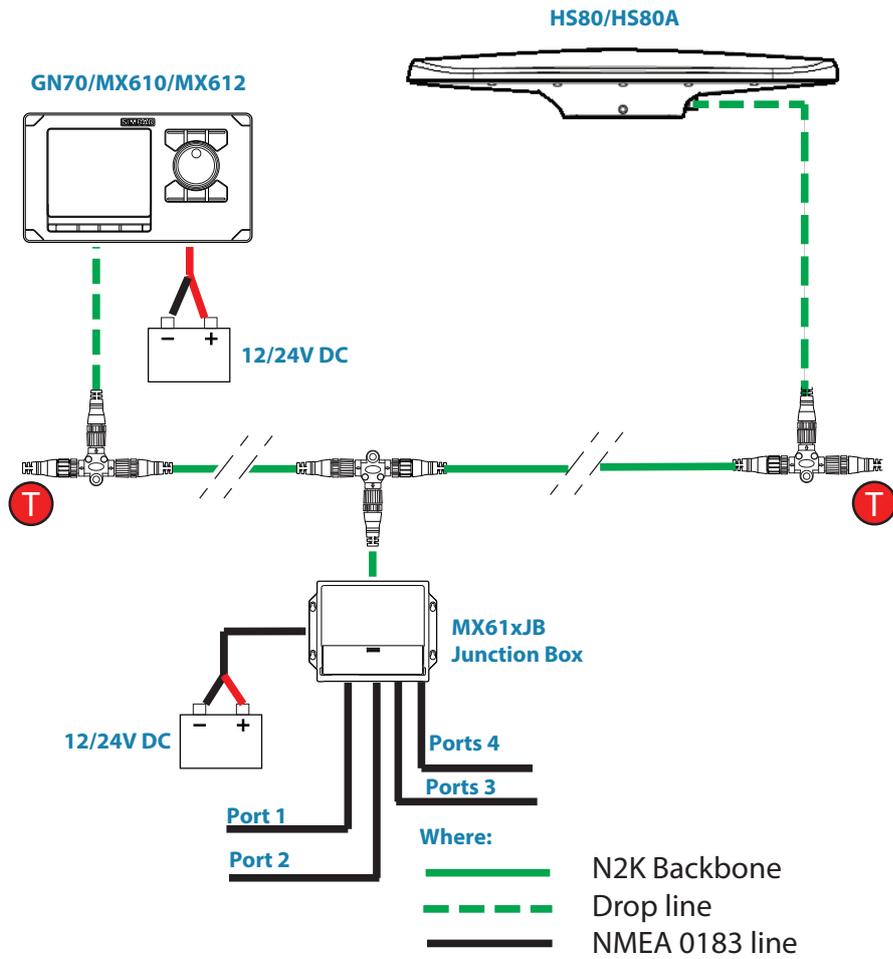
HS80/HS80A N2K connection

16 Specifications

Technical specifications

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

GN70/MX610/MX612 control unit

	GN70	MX610/MX612
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)	
Waypoints	2000	
Routes	100 Routes with a dynamic number of waypoints; up to 2000 in all routes	
Tracks	2000	
NETWORKING		
CAN bus	NMEA 2000 (N2K)	
Ethernet (LAN)	Yes- used for software update and NMEA 0183/IP	
USB Socket	No	Yes
POWER		
Local supply	12/24 VDC +30-10%	
Consumption local supply	0.7/0.4 A at 12 VDC 0.4/0.3 A at 24 VDC "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)	1.4 Kg (3.0 lbs.)
Size	230 (W) x 144 (H) x 54 (D) mm	252 (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, LAN connectors	

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

MX61xJB junction box

	MX610JB	MX612JB
POWER		
Local supply	12/24 VDC, +30 - 10%.	
Consumption local supply	0,3 - 5 A CAN bus load dependent	
NMEA 2000 LEN* (50 mA)	1	3
Output for CAN bus supply	15 VDC, +/- 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)	4.4 kg (9.5 lbs.)
Size (width x height x depth)	211 x 180 x 60 (mm)	340 x 250 x 100 (mm)
Mounting	Bulkhead	
Material	Plastic + Anodized aluminium	Aluminum
Color	Black	
Cable inlet	Slots: 9 x 95 mm and 18 x 45 mm (0.4" x 3.7" and 0.7" x 1.8")	Rubber cable glands
Data I/O		
NMEA 2000	1x CAN bus	
NMEA 0183 Ver. 4.0	4x - Bidirectional RS-422 Serial ports (+/-5 V)	12x - Bidirectional RS-422 Serial ports (+/-5 V)
Baud rate	4800 (default) configurable by GN70/MX610/MX612	
Log Pulses I/O	1x Bidirectional RS-422 port (PPM configurable by MX610/MX612)	

Smart antenna unit

	GS70	MX521A	MX521B	HS80/ MX575C	HS80A/ MX575D
Receiver Type	L1 C/A code, 1.575 GHz	L1 C/A Code @ 1.575 GHz	L1 GPS + GLONASS	L1 C/A Code @ 1.575 GHz	L1 GPS + GLONASS
Number of Channels	32	12	270	12	540
Position Update rate	Up to 10 Hz (1, 5, 10)	Up to 10 Hz (1, 2, 5,10)			
GPS Accuracy (2 DRMS)	≤5 m	≤3 m			
DGPS Accuracy	≤2 m	≤1 m			
Cold start	50 sec.	60 sec.			
Warm start	3 sec.	10 sec.			
WAAS (SBAS)		Yes (SBAS is not yet approved by IMO)			
Beacon receiver	No	Yes		HS80 - No MX575C - Yes	HS80A - No MX575D - Yes
Operating Mode	No	Manual, Automatic and Database			
Channels	No	2 channel - parallel tracking			
Beacon Freq.	No	283.5 to 325.0 KHz			
Compliance	No	IEC 61108-4 beacon standard			
Input voltage	9-18 VDC	10-32 VDC			
Reverse polarity protection		Yes			
Power consumption	<2 Watts	<2 Watts		<3 Watts	
Data I/O Protocol	NMEA 2000	NMEA 1083		NMEA 2000/NMEA 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			
Temperature, storage	-40°C to +85°C	-30°C to +70°C			
Protection		IPX6,7 (Exposed category)			

	GS70	MX521A MX521B	HS80/ MX575C	HS80A/ MX575D
MECHANICAL				
Weight	0.14 Kg (0.3 lbs.)	0.6 Kg (1.3 lbs.)	2.4 Kg (5.4 lb.)	
Size (length x width x height)	90 mm (Dia.) x 38 mm (H)	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	Surface mount or Pole			
Material	Plastic			
Color	White	White w/ red band	White -top, dark gray -bottom	

→ *LEN - Load Equivalent Number @ 50 mA.

GN70/MX610/MX612 Connector Pinouts

1 Power

2 N2K bus

3 Ethernet
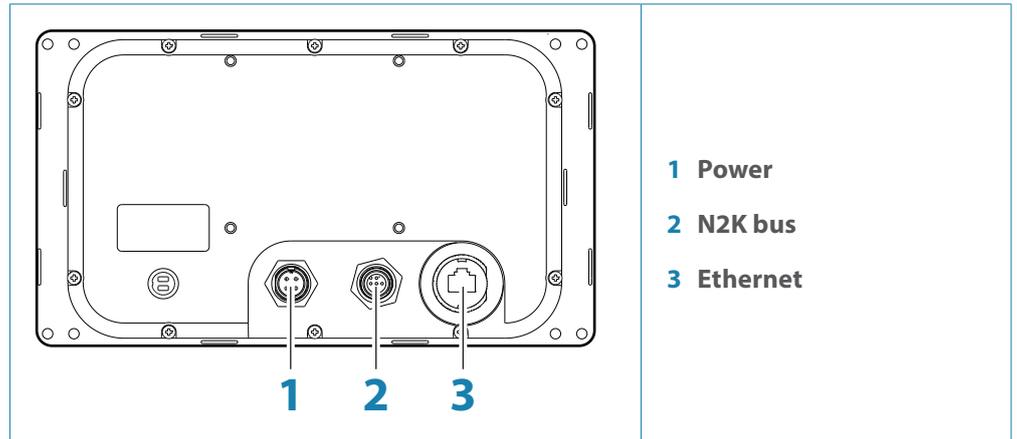
Power

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
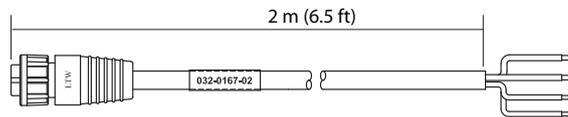
CAN/NMEA 2000

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

MX610JB Channels	MX612JB Channels	Default name	Default sentences	Default Baud rate
1	1	MXJB-NMEA1	GGA, DTM, ZDA,VTG, HDT	4800
2	2	MXJB-NMEA2		
3	3	MXJB-NMEA 3 - (ANTENNA - GPS I/O)*	Off	19.2K
4	4	MXJB-NMEA4 - (ANTENNA - BEACON Out)*	Off	4800
N/A	5	MXJB-NMEA5	GGA, DTM, ZDA,VTG, HDT	4800
N/A	6	MXJB-NMEA6		
N/A	7	MXJB-NMEA7	Off	19.2K**
N/A	8	MXJB-NMEA8	Off	4800
N/A	9	MXJB-NMEA9	GGA, DTM, ZDA,VTG, HDT	4800
N/A	10	MXJB-NMEA10		
N/A	11	MXJB-NMEA11	Off	19.2K**
N/A	12	MXJB-NMEA12	Off	4800

* Option for MX521A, MX521B, MX525A and MX575C, MX575D, HS80 and HS80A antenna connection

** Manually configure to 4800 after restore to default is done.

GN70/MX610/MX612 communications (via NMEA 0183)

Sentence	NMEA 0183 In	Out	Message Data Type
ACK	√		Acknowledge Alarm
ALR	√		Set Alarm State
APB	√	√	Autopilot Sentence "B"
DPT	√	√	Depth
DTM	√	√	Datum
GBS	√	√	GNS Satellite Fault Detection
GGA	√	√	Global Position System Fix data
GLL	√	√	Geographic Position - Lat/Lon
GNS	√	√	
GRS	√	√	GNSS Range Residuals
GSA	√	√	GNS DOP's And Active Satellites
GSV	√	√	GNSS Satellites in View
HDG	√	√	Heading Deviation & Variation
HDT	√	√	Heading True
MWV	√		Wind Data
RMC	√	√	Recommended Minimum Specific GNSS Data
ROT	√	√	Rate Of Turn
RTE	TBD	√	Routes
THS	√	√	True Heading
VHW	√	√	Water Speed and Heading
VTG	√	√	Course and Speed Over Ground
WPL	TBD	√	Waypoints
XTE	√	√	Cross Track Error, Measured
ZDA	√	√	Time & Date

Proprietary messages			
$PMVXG,GBS	√		Fills in RAIM integrity in 129029 field
$PCSI,CS0	√		Beacon/WAAS Reference station data
$PMVXG035	√		MX 035 Proprietary message
$PMVXG,312	√		DGPS Corrections
$PMVXG,313	√		GPS Satellite Health
$PMVXG,314	√		
$PMVXG,315	√		
$PMVXG,316	√		
$PMVXG,317	√		

GS70/HS80 smart antenna communications (N2K)

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	Position on, 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 MX610/MX612

++Additional NMEA 2000 messages for AIS

NMEA 2000 messages	
PGN number	**PGN Title**
129038	AIS Class A position report
129039	AIS Class B position report
129040	AIS Class B extended position report
129041	AIS Aids to Navigation (A to N) report
129792	AIS DGNSS broadcast binary message
129793	AIS UTC and date report
129794	AIS Class A Static and Voyage Related Data
129795	AIS Addressed Binary Message
129796	AIS Acknowledge
129797	AIS Binary Broadcast Message
129800	AIS UTC/Date Inquiry
129801	AIS Addressed Safety Related Message
129802	AIS Safety Related Broadcast Message
129803	AIS Interrogation
129804	AIS Assignment Mode Command
129805	AIS Data Link Management Message
129806	AIS Channel Management
129807	AIS Group Assignment
129809	AIS Class B "CS" Static Data Report, Part A
129810	AIS Class B "CS" Static Data Report, Part B

GPS and GNSS (GPS+GLONASS) modes NMEA 0183 messages

GPS Mode	GNSS mode	Remarks
GPGGA	Not applicable	GGA message is used in GPS mode only
GPGNS	GNGNS	GNSS Fix Data
GPZDA	GPZDA	Normally the time reference is synchronized to GPS time, so ZDA stays with GP talker in combined mode
GPDTM	GNDTM	DATUM
GPGBS	GNGBS	RAIM sentence
GPRMC	GNRMC	Recommended Minimum Specific GNSS Data
GPVTG	GNVTG	COG/SOG data

Where:

$GPxxx - NMEA message header when autonomous GPS system is used

$GNxxx - NMEA message header when combined GPS and GLONASS system is used