ST60 Graphic Display
Commissioning Guide

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Important information

About the documentation

Welcome to the Raymarine ST60 Graphic Display.

The documentation for your ST60 Graphic Display is arranged so that you can install, commission and quickly use your Display, keeping to hand only the information necessary.

- **Installation Guide** - One easy-to-understand sheet guides you through the installation process. This sheet can be discarded once the installation is complete.
- **Commissioning Guide** (this book) - Describes how to connect and setup your ST60 Graphic Display.
- **Quick Start Guide** - Once your ST60 Graphic Display has been commissioned, this handy guide to the main operations enables you to use it right away.
- **Operating Guide** - Contains a detailed description of your ST60 Graphic Display's features and functions.

Safety notices

WARNING: Product installation & operation
This equipment must be installed and operated in accordance with the Raymarine instructions provided. Failure to do so could result in poor product performance, personal injury and/or damage to your boat.

WARNING: Electrical safety
Make sure you have switched off the power supply before you start installing this product.

WARNING: Navigation aid
This unit is only an aid to navigation. Its accuracy can be affected by many factors, including equipment failure or defects, environmental conditions, and improper handling or use. It is the user's responsibility to exercise common prudence and navigational judgements. This unit should not be relied upon as a substitute for such prudence and judgement. Always maintain a permanent watch so you can respond to situations as they develop.

CAUTION: Setup requirement
The ST60 Graphic Display is calibrated to factory (default) settings when first supplied. To ensure optimum performance on your boat, this product must be setup before use. Do NOT use the product until it has been setup using the procedures in *Chapter 2, Preparation for Use*.

EMC Installation Guidelines

All Raymarine equipment and accessories are designed to the best industry standards for use in the recreational marine environment.

Their design and manufacture conforms to the appropriate Electromagnetic Compatibility (EMC) standards, but correct installation is required to ensure that performance is not compromised. Although every effort has been taken to ensure that they will perform under all conditions, it is important to understand what factors could affect the operation of the product.

The guidelines given here describe the conditions for optimum EMC performance, but it is recognized that it may not be possible to meet all of these conditions in all situations. To ensure the best possible conditions for EMC performance within the constraints imposed by any location, always ensure the maximum separation possible between different items of electrical equipment.

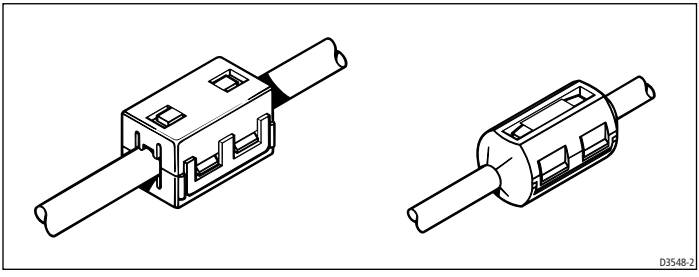
For **optimum** EMC performance, it is recommended that **wherever possible**:

- Raymarine equipment and cables connected to it are:
  - At least 3 ft (1 m) from any equipment transmitting or cables carrying radio signals e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 7 ft (2 m).
  - More than 7 ft (2 m) from the path of a radar beam. A radar beam can normally be assumed to spread 20 degrees above and below the radiating element.
- The equipment is supplied from a separate battery from that used for engine start. Voltage drops below 10 V in the power supply to our products, and starter motor transients, can cause the equipment to reset. This will not damage the equipment, but may cause the loss of some information and may change the operating mode.
- Raymarine specified cables are used. Cutting and rejoining these cables can compromise EMC performance and must be avoided unless doing so is detailed in the installation manual.

- If a suppression ferrite is attached to a cable, this ferrite should not be removed. If the ferrite needs to be removed during installation it must be reassembled in the same position.

Suppression Ferrites

The following illustration shows typical cable suppression ferrites used with Raymarine equipment. Always use the ferrites supplied by Raymarine.



Connections to Other Equipment

If your Raymarine equipment is to be connected to other equipment using a cable not supplied by Raymarine, a suppression ferrite MUST always be attached to the cable near the Raymarine unit.

Product information

To the best of our knowledge, the information in this book and other product documentation was correct when printed. However, our policy of continuous product improvement and updating may change product specifications without notice, so unavoidable differences may occur between the product and the information supplied with it.

Raymarine cannot accept liability for inaccuracies or omissions in any product documentation.

Contents

Chapter 1: System Connections

1.1 Overview

This chapter assumes the ST60 Graphic Display has been fitted in accordance with the instructions in the *ST60 Graphic Display Installation Guide*.

Mandatory connections

The ST60 Graphic Display receives both data and power from SeaTalk. You must therefore connect at least one SeaTalk cable from the ST60 Graphic Display to SeaTalk as described below.

As it is not possible to describe connections for all possible SeaTalk configurations, the instructions given here describe the general requirement. Adapt these instructions, to suit your particular situation.

A range of Raymarine SeaTalk extension cables and Raymarine 3-way SeaTalk junction boxes are available to provide maximum flexibility when installing your display.

Optional connections

The **NMEA IN** and **NMEA OUT** connectors provide a useful means of communicating with external systems, but you can carry out all basic operations without making any NMEA connections.

1.2 Connecting to SeaTalk

Power requirements

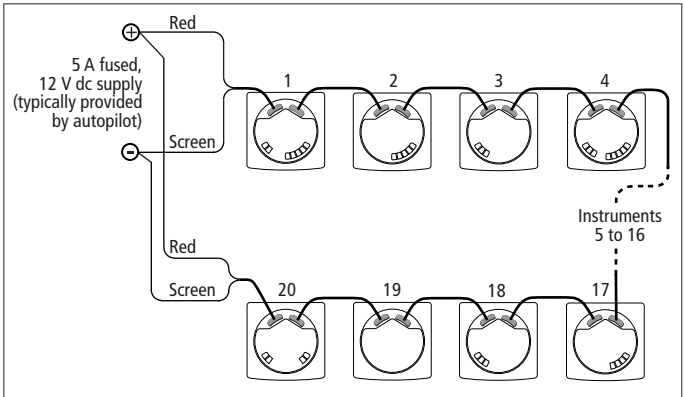
CAUTION:
When instruments are connected to SeaTalk, ensure that the power supply for the SeaTalk 12 V line is protected by a 5 A fuse.

As the instruments in a SeaTalk system are powered from SeaTalk, systems comprising a large number of instruments may require connections to the power supply from each end of the system ('ring-main' style), to maintain sufficient voltage throughout the system.

This requirement depends on the total length of the SeaTalk cable run and the total number of instruments in the system. Before connecting the ST60 Graphic Display, ensure that the system with the display included, will

receive a satisfactory power supply. The requirements for power connections are detailed in the following table.

SeaTalk cable run	No. of instruments	Power connections
Up to 10 m	13 maximum	To one end of the system
	26 maximum	To both ends of the system
Up to 20 m	7 maximum	To one end of the system
	13 maximum	To both ends of the system

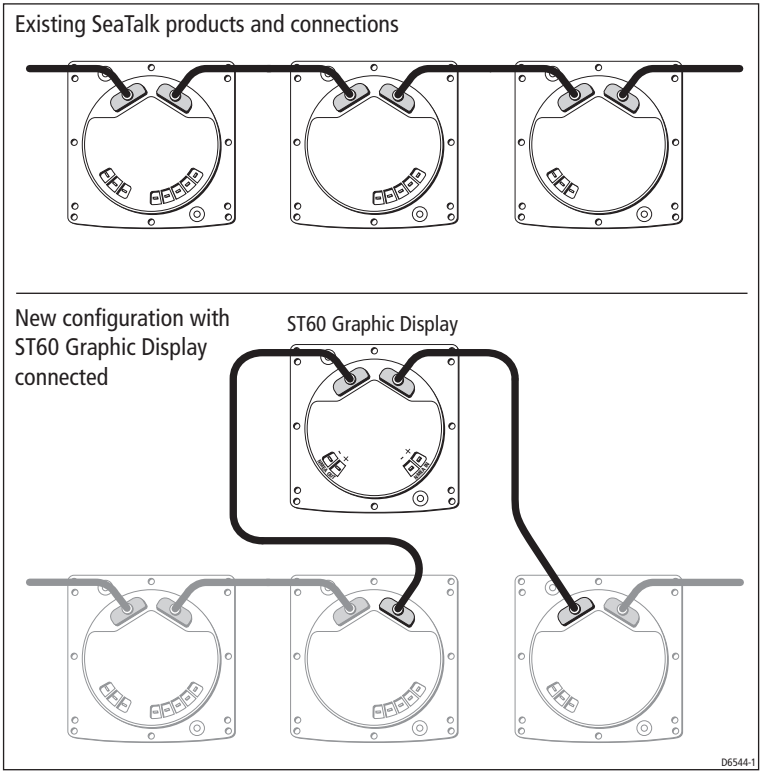


SeaTalk power connections

Connection procedure

To connect your ST60 Graphic Display:

1. Ensure that:
   - Power to the existing SeaTalk system is switched off.
   - The conditions described under *Power requirements* are fulfilled.
2. Plug the SeaTalk cable(s) from the rear of the display into a vacant SeaTalk connector on an adjacent instrument. You can either break the existing SeaTalk chain to connect as shown in the following illustration, or connect to an existing product at the end of the SeaTalk bus.



1.3 Using the NMEA IN and OUT connectors

Although the NMEA connectors provide a useful means of interfacing with external systems, you do not **have** to connect to NMEA if you are receiving the data you want from SeaTalk.

CAUTION: Connections to other equipment
If you are connecting any Raymarine product to other equipment, using a non-Raymarine cable, you MUST fit an appropriate suppression ferrite to the cable near to the Raymarine product.

If you want to connect your **NMEA IN** and **NMEA OUT** connectors to an NMEA device:

- Terminate each cable in an appropriate manner for connection to the device.
- Ensure a ferrite is fitted to each cable, adjacent to the ST60 Graphic Display.

What NMEA data is supported?

SeaTalk to NMEA 0183

Data from SeaTalk is transmitted to the **NMEA OUT** connector every 2 seconds. The supported NMEA output data is detailed in the following table.

Data	NMEA Header
Depth	DBT
Heading, deviation and variation	HDG
Magnetic heading	HDM
Water temperature	MTW
Wind speed and angle	MWV
Water speed and heading	VHW

NMEA to SeaTalk

When certain NMEA data is available at the **NMEA IN** connector, it is decoded and displayed by the ST60 Graphic Display. The supported NMEA input data is detailed in the following table.

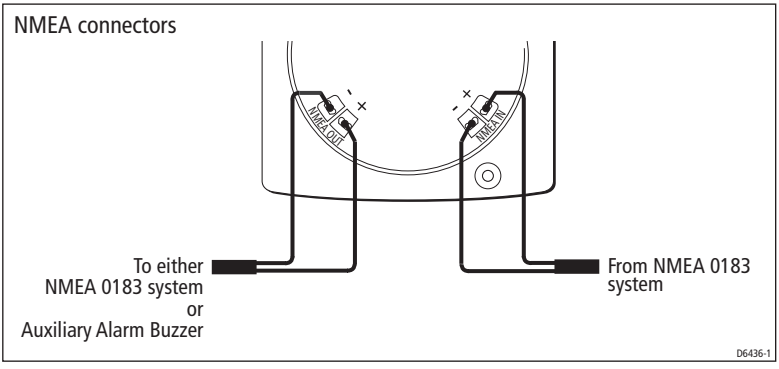
Data	NMEA Header
XTE, Waypoint identifier, Bearing & distance to waypoint	APB
Bearing & distance to waypoint	BWC
Bearing & distance to waypoint rhumb line	BWR
Latitude and longitude	GLL
Time, latitude, longitude, satellites tracked & HDOP	GGA
Cross track error	MWV or XTE
Navigational information	RMB
Time, date, lat, long, COG & SOG	RMC
COG and SOG	VTG

Alternative uses of NMEA OUT connector

The **NMEA OUT** connector can be used in either of the following ways:

- To output supported NMEA data to an external NMEA system.
- To connect alarm signals to an Auxiliary Alarm.

Note: *If you connect the* **NMEA OUT** *connector to an Auxiliary Alarm, you can still use the* **NMEA IN** *connector to receive data from NMEA.*



Defining the NMEA OUT connector function

Before the ST60 Graphic Display is used, you must use the procedures in *Chapter 2, Initial Setup to* define how the **NMEA OUT** connector is connected (i.e. for **either** NMEA out data **or** Auxiliary Alarm).

Chapter 2: Preparation for Use

2.1 Introduction

Use this chapter to set up and check the ST60 Graphic Display, before it is used operationally. Instructions are given to enable you to:

- Define the function of the **NMEA OUT** connector (see *Chapter 1, System Connections*).
- Carry out Dealer calibration.
- Check basic operation.

EMC conformance

Always check the installation before going to sea to make sure that it is not affected by radio transmissions, engine starting etc.

2.2 Initial setup

Defining the NMEA OUT connector function

The **NMEA OUT** connector can be used to either:

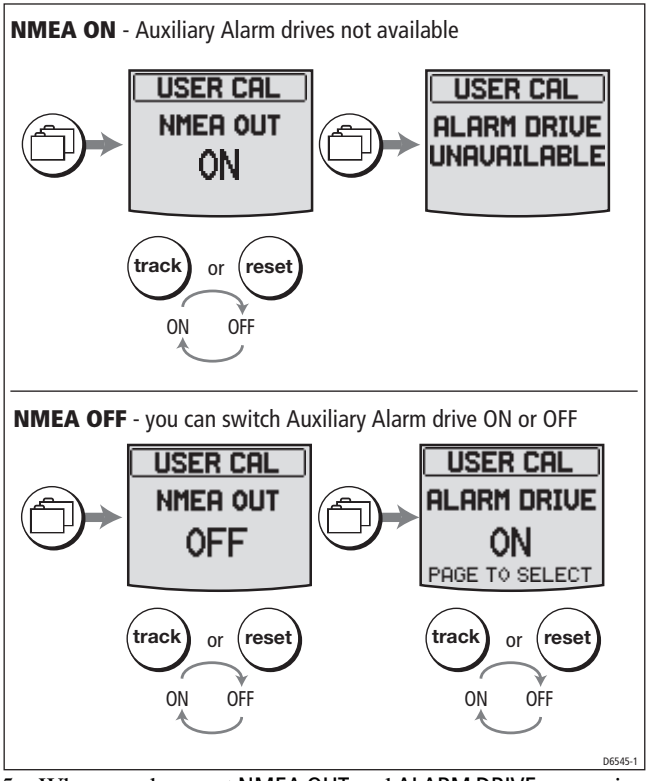
- Output supported NMEA data to an external NMEA system.
  or
- Output alarm signals to an Auxiliary Alarm.

If a connection is made to the **NMEA OUT** connector, use the following procedure to define the function:

1. Hold down the ▭ and ▤ buttons for approximately 2 seconds so that the User calibration entry screen is displayed.

Note: *The User calibration entry screen will time out to the main display after 7 seconds, if you do not proceed.*

2. Press the ▭ button to enter User calibration.
3. Use the ▭ button to cycle to the NMEA on/off screen.
4. Use the **track** or **reset** button to switch the NMEA OUT function ON or OFF, as required. If you set:
   - NMEA ON, then the Auxiliary Alarm output is disabled and the next screen shows ALARM DRIVE UNAVAILABLE.
   - NMEA OFF, then the Auxiliary Alarm output is available and you can switch the Auxiliary Alarm drive ON or OFF at the next screen, using the **track** or **reset** buttons.



5. When you have set NMEA OUT and ALARM DRIVE as required, hold down the and buttons for approximately 2 seconds to return to normal operation.

Other User calibration functions

Comprehensive User calibration instructions are given in the *ST60 Graphic Display Operation Guide*. You can:

- Set the Favorite page rollover period, or switch the rollover off.
- Switch chapter titles on or off.
- Set whether headings are displayed in true or magnetic form.
- Set the voltage at which a battery alarm will occur.
- Enable/disable individual local alarms.
- Set the date format.
- Set the time format.

- Set the instrument time to local time.
- Select the units in which temperature, speed, trip, depth and wind speed from NMEA, are displayed.
- Select the function of the display **NMEA OUT** connector. This is either
  - A remote alarm output for the Auxiliary Alarm (NMEA OFF),

  or
  - NMEA output signals.
- Enable/disable individual remote alarms.
- Enable/disable the pilot pop up display.
- Configure the instrument to display specific pages.

Dealer calibration

Summary

The Dealer calibration procedures enable you to set:

- Access to User calibration on/off.
- Response settings for speed, depth heading wind angle, wind speed, VMG, course over ground and speed over ground.
- The correct battery voltage reading.

Dealer calibration also gives access to:

- A default reset screen. This enables you to re-apply the factory settings if you want to reset the instrument to a known operating condition.
- A self-test entry screen.

Procedure

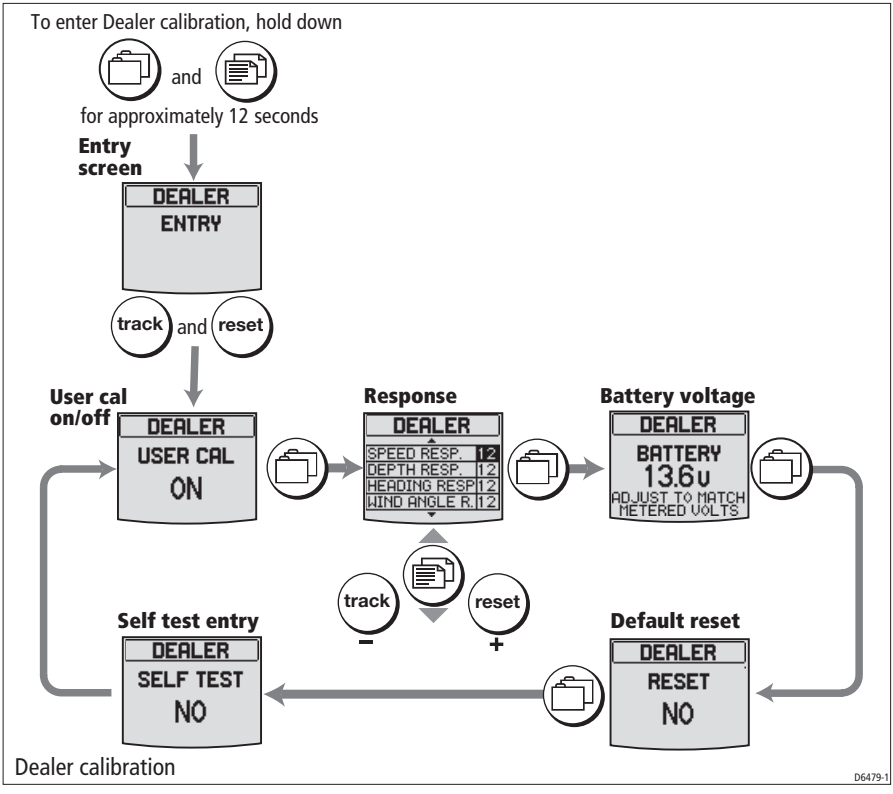
To carry out Dealer calibration:

1. hold down the ▭ and ▭ buttons together for approximately 12 seconds, to select the Dealer calibration entry page (see *Dealer calibration* diagram).
2. Press the **track** and **reset** buttons together, to start Dealer calibration.
3. Referring to the Dealer calibration diagram below, use the ▭ button to cycle to each screen in turn, and set the appropriate values as described below.

User calibration on/off

Press the **track** or **reset** button to toggle the User calibration either ON or OFF as required.

Note: *If at any time, you want to access the software version and serial number, you need to set User calibration* ON.



Response settings

The response values determine the sensitivity of the display to data changes. You can set each response value from 1 to 15. A low number provides a smooth response and a high number a much livelier response.

Use the button to select the response you want to set, then use the **track** (decrement) and **reset** (increment) buttons to set the required value.

You can set responses for the following data:

- Speed (SPEED RESP.)
- Depth (DEPTH RESP.)
- Heading (HEADING RESP.)
- Wind angle (WIND ANGLE R.)
- Wind speed (WIND SPEED R.)
- Cross track error (XTE RESP.)

Battery voltage

Use the BATTERY screen to set the voltage reading at the ST60 Graphic Display to be the same as the actual supply voltage from the boat's electrical system.

WARNING:
High voltages can cause death or serious injury. Always take appropriate precautions when working with electricity. Before accessing the electrical system, ensure you know the location of high voltage points and stay well clear of them.

To set the voltage reading at the ST60 Graphic Display:

1. With the BATTERY screen displayed, measure the 12 V supply voltage at the battery.
2. At the ST60 Graphic Display, use the **track** or **reset** button to set the displayed voltage to the same value as the measured voltage.

Default reset

You can use this screen to reset the ST60 Graphic Display operating parameters to the factory default values. If you want to apply the factory defaults, ensure the display shows YES, but if you want to retain the current values, **ensure that the display shows NO**. Use the **track** and **reset** buttons to make the required selection.

If you have selected YES, the factory defaults will be applied when you exit this screen.

The factory default values are as follows:

Parameter	Factory default
Last display	Speed
Heading	Magnetic
Temperature units	Degrees Celsius

Parameter	Factory default
Depth units	Feet
Speed units	Knots
Wind speed units	Knots
Variation	None
Alarms	All enabled
User calibration	Enabled
Depth response	12
Speed response	12
Heading response	12
Wind angle response	12
Wind speed response	12
VMG response	12
COG/SOG response	12
Alarm control	On
NMEA	Off
Auxiliary alarms	All off
Low voltage threshold	Off
Display contrast	40
Pilot pop-up	Off
Waypoint identity	Name
Time offset	0 (zero)
Chapter titles	On
Remote group	None
Remote sequence	None

Self test

Self test is intended for engineers engaged in diagnostic procedures. Always set this to NO.

Note: *If* YES *is selected, you could inadvertently initiate a self test routine. This will not harm the product but will interrupt operation, so it is therefore NOT recommended.*

Leaving Dealer calibration

Hold down the and buttons for 2 seconds to save your settings and exit Dealer calibration.

2.3 Checking operation

When installation and initial set up are complete, check that the ST60 Graphic Display performs satisfactorily by carrying out basic checks and NMEA checks, before operational use.

Basic checks

Ensure that the display shows the appropriate chapters and pages, as described in the *ST60 Graphic Display Operation Guide*. When doing this, be aware that some data types may not be supported by your system and therefore will not be displayed on your ST60 Graphic Display. If you think that data is missing, ensure that your system supports this data before assuming that a fault exists.

NMEA checks

Ensure that the display operates satisfactorily with any NMEA equipment to which it is connected.

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