150G/400G Rate Gyro Assembly
Installation Guide

Document number: 84138-1
Date: July 2002

Raymarine
ON BOARD
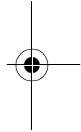
Important information

Safety notices

WARNING: Product installation

This equipment must be installed and operated in accordance with the instructions contained in this handbook. Failure to do so could result in poor product performance, personal injury and/ or damage to your boat.

Because correct performance of the boat's steering is critical for safety, we STRONGLY RECOMMEND that an Authorized Raymarine Service Representative fits this product.

WARNING: Navigation aid

Although we have designed this product to be accurate and reliable, many factors can affect its performance. As a result, it should only be used as an aid to navigation and should never replace commonsense and navigational judgement. Always maintain a permanent watch so you can respond to situations as they develop.

EMC conformance

All Raymarine equipment and accessories are designed to the best industry standards for use in the recreational marine environment. The design and manufacture of Raymarine equipment and accessories conform to the appropriate Electromagnetic Compatibility (EMC) standards, but correct installation is required to ensure that performance is not compromised.

Handbook information

To the best of our knowledge, the information in this handbook was correct when it went to press. However, Raymarine cannot accept liability for any inaccuracies or omissions it may contain. In addition, our policy of continuous product improvement may change specifications without notice. As a result, Raymarine cannot accept liability for any differences between the product and the handbook.

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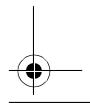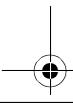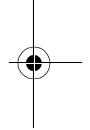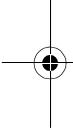
Introduction

The Rate Gyro assembly is an option to fit on T150 and T400 Course Computers. It provides the Course Computer with precise information about the boat's yaw (its rate of turn). The Course Computer uses this information to improve course keeping:

Connecting the Rate Gyro enables nine response levels, providing enhanced course keeping using AST (Advanced Steering Technology). It also allows access to AutoLearn (self-learning steering calibration) when used with ST6001+ or ST7001+ control units.

Parts supplied

The following items are supplied in the Rate Gyro assembly package:

1. GyroPlus yaw sensor
2. M3 x 12 cap socket screw (x2)
3. Standoff pillar (x2)
4. Large FET pad
5. Insulation spacer
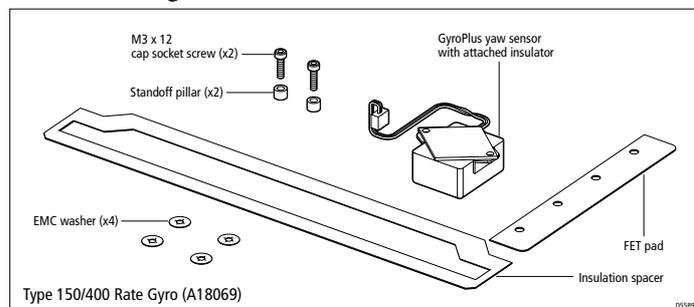6. EMC washers (x4)
7. Installation guide

Figure 1:   Contents of Rate Gyro assembly kit

Tools required

To install the Rate Gyro you will need:

1. 2.5 mm and 3 mm allen keys
2. Flat-bladed screwdriver
3. Cross-head/Pozi-drive screwdriver
4. 7 mm socket spanner

Installing the Rate Gyro assembly

Overview

The Rate Gyro assembly is an internal addition to the T150/T400 Course Computer. The T150/T400 will need to be removed from its in-service location and disassembled at a suitable anti-static workstation. The Rate Gyro assembly can then be added and the product reassembled.

Once the Rate Gyro has been fitted, the Course Computer (now a Type 150G/400G) can be reinstalled.

Removal of the T150/T400 Course Computer

⚠️ **WARNING: Electrical Safety**

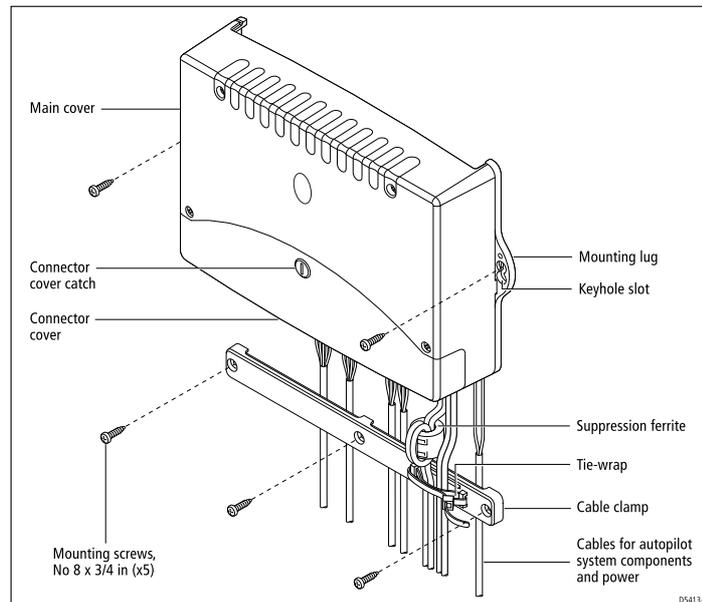**Ensure the power supply is switched off before proceeding.**

Figure 2:   The Course Computer

Remove the connector cover

Use a flat-bladed screwdriver or small coin to rotate the catch $^1/_4$ turn (90°) in either direction – until you hear a click and the slot is horizontal. The cover can then be lifted off.
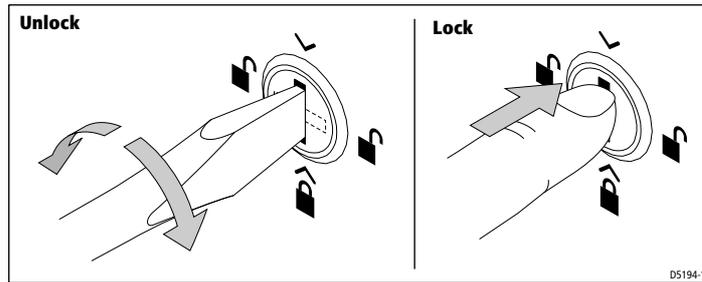

Figure 3:   Unlocking and locking the connector cover

Disconnect power, input and output cables

When you have removed the connector cover, you will see the Course Computer inputs, outputs and fuses. Disconnect and label all the cables from the connector panel leaving the cable clamp in place.
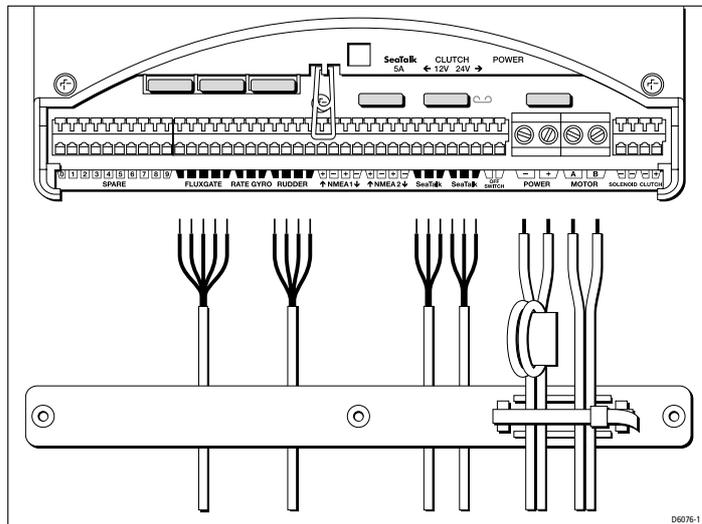

Figure 4:   Disconnection of Course Computer cabling

Remove the Course Computer

Loosen the fixing screws on either side of the Course Computer until the head of each screw is at least 6 mm (¼ in) from the surface. Lift the Course Computer so that the screw heads are at the bottom of the keyhole slots, then gently draw it away from the surface. The screw heads should pass through the keyhole slots and the unit will become free.
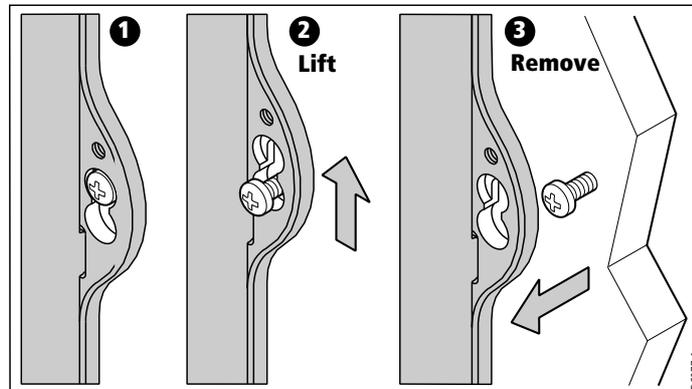

Figure 5: Removal of Course Computer

Note: *For correct operation of the Rate Gyro assembly, it is imperative that the Course Computer is mounted within 10° of the vertical. If the present location is unsuitable for vertical mounting, relocation to a more suitable position will be necessary following the Rate Gyro upgrade.*
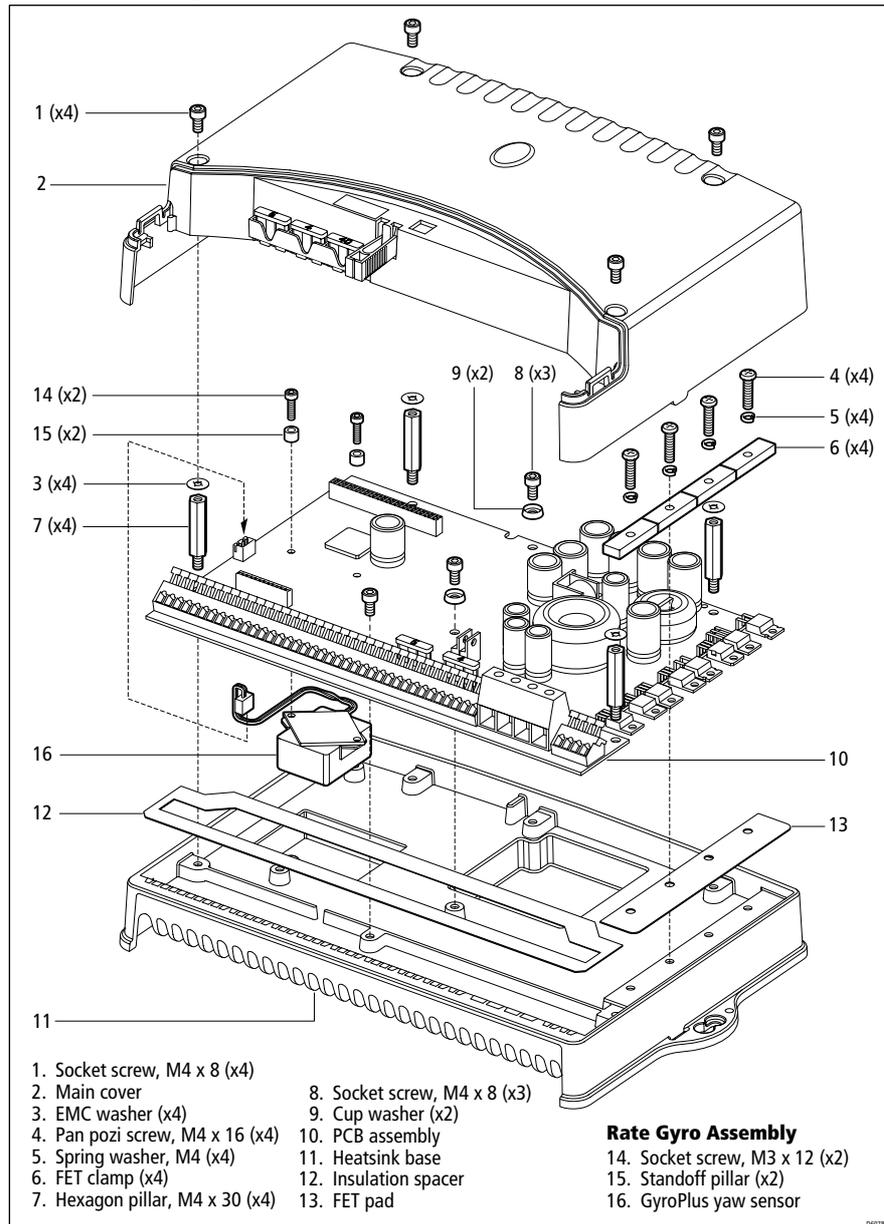
Course Computer main elements

1. Socket screw, M4 x 8 (x4)
2. Main cover
3. EMC washer (x4)
4. Pan pozi screw, M4 x 16 (x4)
5. Spring washer, M4 (x4)
6. FET clamp (x4)
7. Hexagon pillar, M4 x 30 (x4)

8. Socket screw, M4 x 8 (x3)
9. Cup washer (x2)
10. PCB assembly
11. Heatsink base
12. Insulation spacer
13. FET pad

Rate Gyro Assembly
14. Socket screw, M3 x 12 (x2)
15. Standoff pillar (x2)
16. GyroPlus yaw sensor

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Figure 6:   Course Computer exploded view

Disassembly of the Course Computer

CAUTION: Electrostatic Discharge (ESD) Precautions

This product contains components that can be damaged by electrostatic discharge.

If the cover is removed, any work on the product must be carried out at a properly equipped anti-static station by personnel wearing anti-static straps.
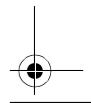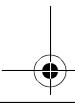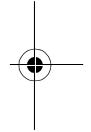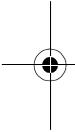
Failure to observe these precautions may damage the equipment.

Note: *The numbered parts refer to the exploded view shown on the previous page.*

1. Unscrew and remove the four main cover screws (1)
2. Remove the main cover (5). Remove and discard the four EMC washers (3) from the underside of the main cover.
3. Unscrew the FET clamp screws (4) and remove the screws, washers (5) and FET clamps (6).

Note: *T150 PCB's have two FET clamps/screws/washers; T400 PCB's have four.*

4. Unscrew and remove the four hexagon pillars (7)
5. Unscrew and remove the three PCB screws (8) and the two cup washers (9).
6. Lift the PCB (10) out of the base casting (11).
7. Remove the FET pad (13) and Insulation spacer (12) and discard.

Installation of the Rate Gyro

1. PCB
2. FET
3. Inductor
4. Rate gyro
5. Socket screw
6. Plastic standoff
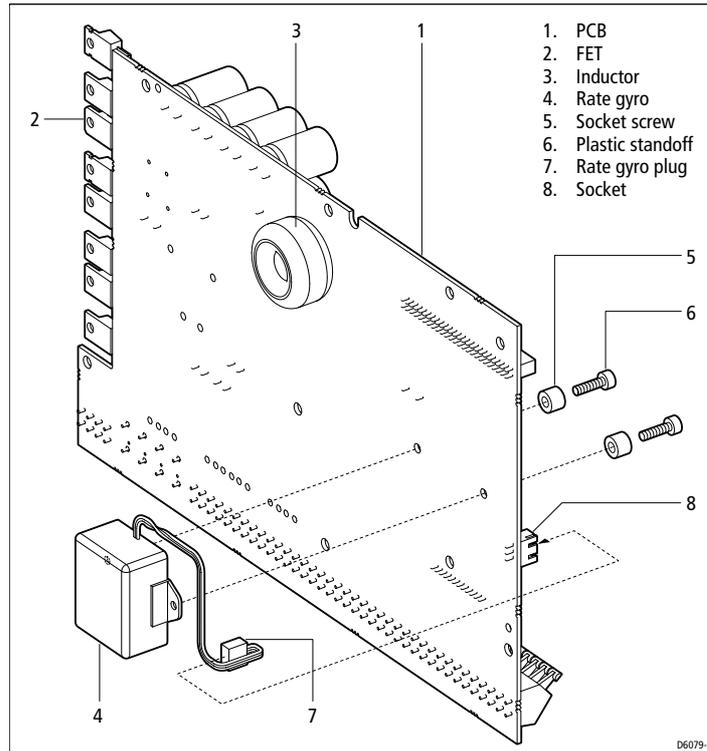7. Rate gyro plug
8. Socket

Figure 7:   Installation of the GyroPlus yaw sensor

1. Turn the PCB (1) so that the reverse side is facing you with the FET's (2) to the left and the inductor (3) uppermost. (see diagram below)
2. Position the GyroPlus yaw sensor (4) so the interface cable protrudes upwards from the sensor, and the rubber face adjoins the PCB.
3. From the front side, pass each screw (5) through a plastic standoff pillar (6), the PCB and screw into the sensor mount. Tighten with a 2.5 mm allen key to secure.
4. Pass the cable around the side of the board and connect to the socket on the front side of the PCB.
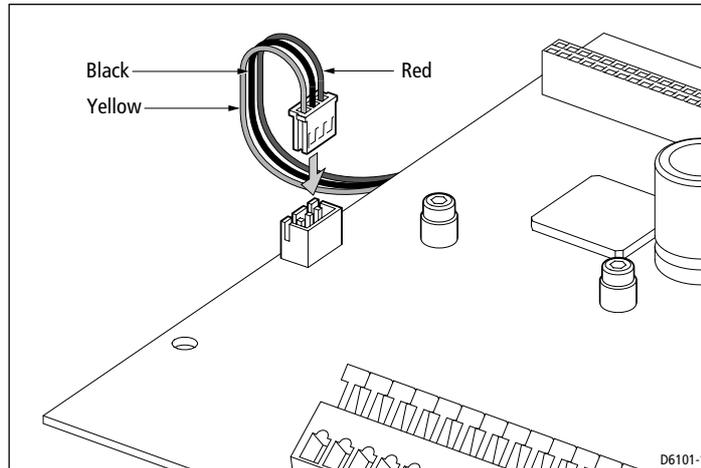
Figure 8:   Rate Gyro Connector Orientation

Note: *The plug is designed to fit one way into the socket. Ensure that the keyed side of the plug faces the outermost side of the PCB when inserted. There are matching slots in the socket to accommodate this.*

Reassembly of the Course Computer

1.   Remove any swarf or debris from the base casting
2.   Fit the supplied replacement FET pad and insulation spacer to the base.
3.   Replace the PCB on the base.
4.   Fit the three PCB screws and two washers and tighten. Note the the screw nearest the connectors does not require a washer.
5.   Fit the four hexagon standoff pillars and tighten.
6.   Fit the FET clamps, washers and screws and tighten.
7.   Fit the new EMC washers to the underside of the main cover, then fit the cover over the PCB. Insert and tighten the four main cover screws.

Refitting the Course Computer

Orientation

CAUTION: Ensure Correct Orientation

For the Rate Gyro to function, you MUST mount the Course Computer so it is level and within +/- 10° of the vertical.

The built-in GyroPlus yaw sensor will NOT work correctly if you mount the computer in any other orientation. This orientation also maximizes the air flow to cool the Course Computer and provides optimum resistance to dripping water.
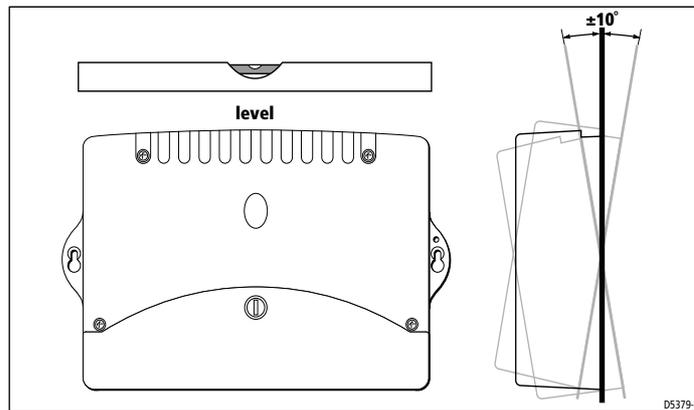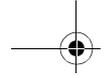
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Figure 9:   Course Computer orientation

If the orientation of the existing installation is not correct then refer to *"Type 150/400 Autopilot System installation guide" (81173)* for installation instructions.

Post-installation procedures

The Course Computer automatically detects that a Rate Gyro is now present and no changes to the software are required. For optimum operation you MUST complete the procedure below.

Course Computer re-calibration

After installing the Rate Gyro you MUST re-calibrate the autopilot.

If you have an ST6001+ or ST7001+ control unit you will be able to use the AutoLearn steering calibration function.

Refer to the control unit owner's handbook for more information about calibrating the Course Computer.
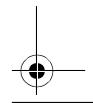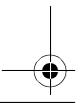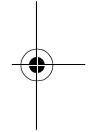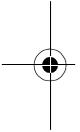
Warranty Certificate

The Raymarine warranty terms and conditions as described below do not affect the customer's statutory rights.

Limited Warranty

Raymarine warrants each new Light Marine Product to be of good materials and workmanship. Raymarine, or it's approved agents, will repair or exchange under warranty any parts proven to be defective in material or workmanship under normal use, for a period of 2 years/24 months from date of sale to end user, or 30 months from date of shipment from Raymarine – whichever expires first, except as provided below.

Raymarine Limited Warranty covers the parts and labor associated with any warranty repair as described above, provided that the unit is returned to Raymarine or one of it's appointed agents.

Installed Warranty

In addition to the **Limited Warranty** cover as described above, Raymarine will, except as provided below, cover travel costs (auto mileage and tolls) up to 100 round trip highway miles (160 kilometers) and travel time of 2 hours, to enable onboard warranty service to be carried out on products where proof of installation or commission by Raymarine certified installers, can be shown.

The **Installed Warranty** provides for onboard repair or exchange, by Raymarine or it's approved service agents, for a period of 2 years/24 months, from date of sale of the boat to the end user – where the equipment has been installed by a Raymarine certified installer, or from commissioning of the installation by a Raymarine certified installer, or 30 months from date of shipment of the equipment from Raymarine – whichever expires first, except as provided below.

Obtaining Warranty Service

In the event of Warranty service being required, contact Raymarine or the nearest Raymarine certified service agent – a full list of local service agents are available on the Internet or can be requested from the nearest Raymarine agent.

A suitable proof of purchase, showing date, place of purchase, and serial number must be made available to Raymarine or authorized service agent at the time of request for Warranty service.

In cases where a Raymarine certified installer has not installed the product; i.e. **Limited Warranty**, the affected unit must be returned to the local Raymarine approved service agent, with a copy of proof of purchase and/or completed warranty card. Subject to the Limitations below, the unit will be repaired/replaced at no further cost to the user and promptly returned to the user.

In cases where the equipment has been installed by a Raymarine certified installer (boat builder, installer dealer etc.), i.e. **Installed Warranty**, the nearest local service agent should be contacted and onboard service requested, the warranty card, correctly completed and stamped by the installing agent, must be available as authorization for onboard service.
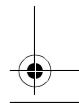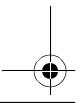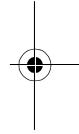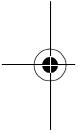
Warranty Limitations

Raymarine Warranty policy does not apply to equipment that has been subjected to accident, abuse or misuse, shipping damage, alterations, corrosion, incorrect and/or non-authorized service, or equipment on which the serial number has been altered, mutilated or removed. Raymarine assumes no responsibility for damage incurred during installation or as a result of improper installation.

This Warranty does not cover routine system checkouts, alignment/calibration, sea-trials or commissioning, unless required by replacement of part(s) in the area being aligned.

A suitable proof of purchase, showing date, place, and serial number must be made available to Raymarine or authorized service agent at the time of request for Warranty service.

Consumable items, (such as: fuses, batteries, drive belts, radar mixer diodes, snap-in impeller carriers, impellers, impeller bearings, and impeller shaft) are specifically excluded from this Warranty.

All costs associated with transducer replacement, other than the cost of the transducer itself, are specifically excluded from this Warranty.

Overtime/premium labor portion of services outside of normal working hours is not covered by this Warranty.

Travel cost allowance on certain products with a suggested retail price below $2500.00 is not authorized. When/or if repairs are necessary, these products must be forwarded to a Raymarine facility or an authorized dealer at owner's expense and then will be returned via surface carrier at no cost to the owner.

Travel costs other than auto mileage, tolls and two (2) hours travel time, are specifically excluded on all products. Travel costs, which are excluded from the coverage of this Warranty, include but are not limited to: taxi, launch fees, aircraft rental, subsistence, customs, shipping and communication charges etc. Travel costs, mileage and time, in excess to that allowed must have prior approval in writing.

TO THE EXTENT CONSISTENT WITH STATE AND FEDERAL LAW:

(1) THIS WARRANTY IS STRICTLY LIMITED TO THE TERMS INDICATED HEREIN, AND NO OTHER WARRANTIES OR REMEDIES SHALL BE BINDING ON RAYMARINE INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABLE OR FITNESS FOR A PARTICULAR PURPOSE.

(2) Raymarine shall not be liable for any incidental, consequential or special (including punitive or multiple) damages.

All Raymarine products sold or provided hereunder are merely aids to navigation. It is the responsibility of the user to exercise discretion and proper navigational skill independent of any Raymarine equipment.

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Stick barcode label here

Purchased from   Purchase date

Dealer address

Installed by   Installation date

Commissioned by

                                        Commissioning date

Owner's name

Mailing address

This portion should be completed and retained by the owner.