

Pathfinder Smart Heading System

Owner's Handbook

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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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About this Handbook

Welcome to the handbook for the *Pathfinder Smart Heading System*, consisting of the GyroPlus 2 unit and the fluxgate compass. This product is primarily designed to provide a fast heading output on NMEA (10 Hz at 0.1° resolution) for MARPA and radar/chart overlay features on Raymarine Pathfinder Plus displays.

Note: *For more information about MARPA and radar/chart overlay, please refer to your Pathfinder Plus owner's handbook.*

The GyroPlus 2 unit can also be used separately to provide rate of turn information for Raymarine course computers (see the Appendix).

This handbook contains the following chapters:

Chapter	Contents	Page
Chapter 1: Introduction	Introduces the Smart Heading System, its components, its features and its use.	page 1
Chapter 2: Installation	Explains how to install the Smart Heading System and make the system connections.	page 3
Chapter 3: Calibration	Explains how to calibrate the Smart Heading System after installation.	page 19
Chapter 4: Fault-finding & Maintenance	Provides general maintenance procedures and information.	page 25
Appendix: Connecting to Autopilots	Explains how to use the GyroPlus 2 unit with Raymarine autopilots.	page 27

At the end of this handbook we have included product specifications and warranty certificate.

Note: *This handbook contains important information about installing, using and maintaining your new Raymarine product. To get the best from the product, please read this handbook thoroughly.*

Important Information

Before using this product, please read the following information about:

- Warranty
- Safety notices
- EMC conformance

Warranty

To register your new Raymarine product, please take a few minutes to fill out the warranty card. It is important that you complete the owner information and return the card to us to receive full warranty benefits.

Safety notices

WARNING: Smart Heading System stabilization

Excessive turn rates during the first 10 seconds after power-up may temporarily reduce Smart Heading System performance.

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 common sense and navigational judgement. Always maintain a permanent watch so you can respond to situations as they develop.

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.

WARNING: Electrical safety

Make sure the power supply is switched off before you make any electrical connections.

WARNING: Calibration requirement

Before using the Smart Heading System, you **MUST** complete the calibration procedures explained in Chapter 3: Calibration.

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.

Chapter 1: Introduction

1.1 System overview

The Pathfinder Smart Heading System is designed to provide a fast, accurate heading output that is suitable for the MARPA and radar/chart overlay features on Pathfinder Plus radars and chartplotters.

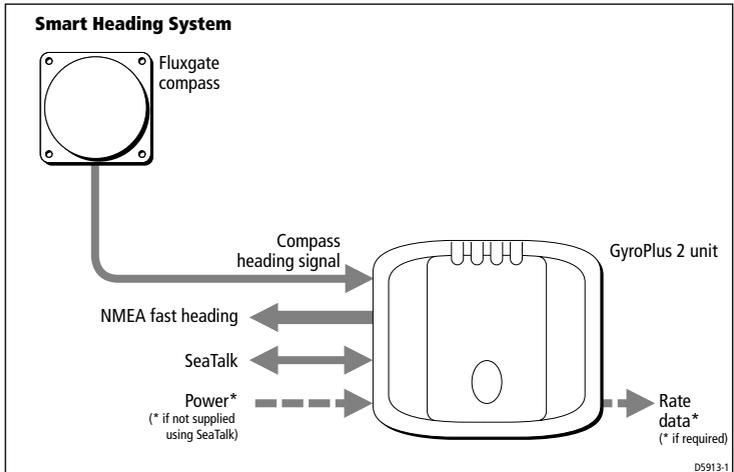
It is designed to operate as part of an integrated Raymarine system, and can be calibrated using a Raymarine Pathfinder Plus display or a Raymarine autopilot control unit.

The heading output is provided as an HDM sentence on NMEA 0183, updated ten times per second. It is accurate to $\pm 2^\circ$ and has a resolution of 0.1° .

Note: For more information, refer to the Specifications on page 32.

As shown in the following diagram, the Smart Heading System consists of two components:

- a fluxgate compass
- and
- a GyroPlus 2 unit



1.2 System components

Fluxgate compass

The fluxgate compass is the direction sensor for the Smart Heading System. It provides the GyroPlus 2 unit with information about the boat's current heading.

GyroPlus 2 unit

The GyroPlus 2 unit contains:

- a rate gyro sensor that measures the boat's yaw (its rate of turn)
- a micro-processor and related circuitry to combine this rate of turn information with the fluxgate compass signal to provide fast, accurate heading output
- inputs and outputs to allow connections with Raymarine equipment

Note: *The GyroPlus 2 unit is primarily designed to be used as part of the Smart Heading System. However, it can also be used as a 'stand alone' sensor to provide rate of turn information for Raymarine course computers. Refer to the Appendix for more information.*

1.3 Using the Smart Heading System

Powering-up

Excessive turn rates during the first 10 seconds after power-up may temporarily reduce Smart Heading System performance. For optimum performance, keep the boat as stable as possible immediately after power-up. This will allow the GyroPlus 2 unit to stabilize.

Radar bearing alignment

For optimum MARPA and radar/chart overlay performance, the radar bearing alignment must be correct on the Pathfinder Plus. Refer to the *Pathfinder Plus Owner's Handbook* for more details.

Chapter 2: Installation

The sections in this chapter explain how to install the Smart Heading System and connect it to Pathfinder Plus units.

Section	Page
Planning the installation	page 4
Installing the GyroPlus 2 unit	page 8
Installing the fluxgate compass	page 12
Connecting to Pathfinder Plus	page 16

WARNING: Calibration requirement

You MUST calibrate the Smart Heading System after installation using a suitable Raymarine autopilot or Pathfinder Plus display (see Chapter 3: Calibration).

Note: *Refer to the Appendix first if you are connecting the GyroPlus 2 unit to a Raymarine autopilot.*

2.1 Planning the installation

Before you start installing the Smart Heading System, read through the information in this chapter. In particular, consider:

- what connections you need to make to Pathfinder Plus units and/or any other Raymarine equipment (see below)
- where you can locate the compass – so it is away from possible sources of magnetic interference
- where you can locate the GyroPlus 2 unit – so it is on a vertical surface
- how you will supply power to GyroPlus 2 unit (via SeaTalk or directly from the boat's distribution panel)
- the EMC and cabling guidelines

Typical integrated systems

When installing the Smart Heading System, you need to make the following connections:

- Smart Heading System:
 - provide power to the GyroPlus 2 unit (see page 11)
 - connect the fluxgate compass to the GyroPlus 2 unit (see page 15)
- Pathfinder Plus connections:
 - connect the Smart Heading System to the Pathfinder Plus using **both** NMEA and SeaTalk
 - the SeaTalk connection allows the Pathfinder Plus unit to calibrate the Smart Heading System (see page 16)
 - the NMEA connection provides the Pathfinder Plus with fast heading data for MARPA and radar/chart overlay (see page 16)

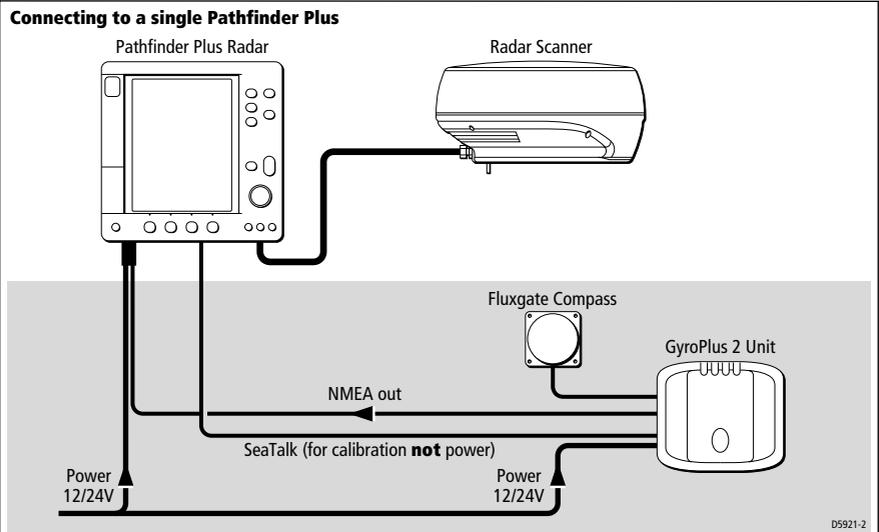
Adding the GyroPlus 2 unit to an autopilot

Refer to the Appendix if you need to add only the GyroPlus 2 unit to a Raymarine autopilot (which has an existing fluxgate compass).

Connecting to a single Pathfinder Plus

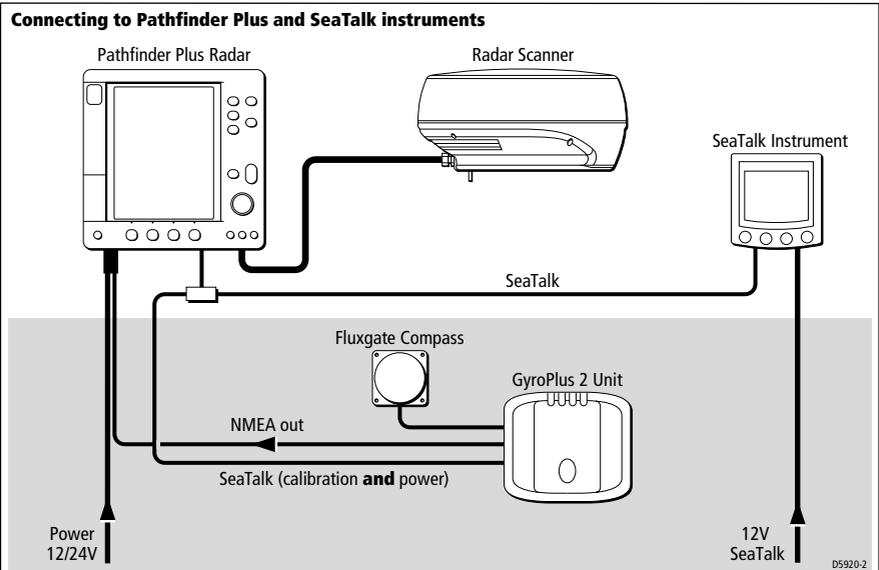
If you connect the Smart Heading System to a single Pathfinder Plus (with no other SeaTalk instruments), you will need to provide power to the GyroPlus 2 unit direct from the distribution panel (see page 11). This is because the Pathfinder Plus does not provide power to SeaTalk.

Note: *If you need to connect the Smart Heading System to more than one Pathfinder Plus, see page 17.*



Connecting to Pathfinder Plus and SeaTalk instruments

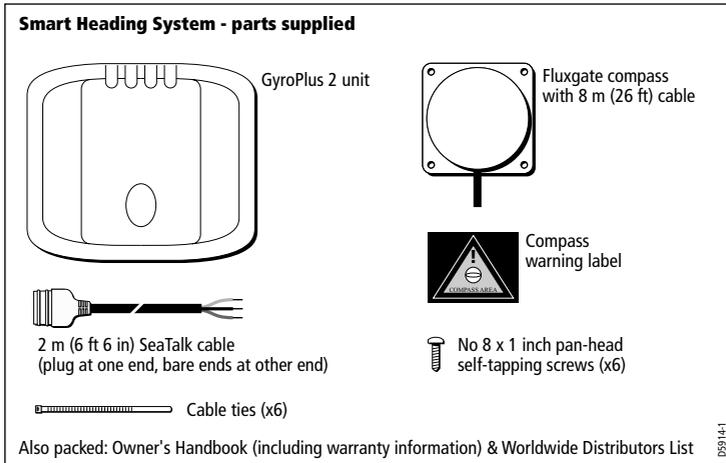
If you connect the Smart Heading System to both a Pathfinder Plus unit and an existing SeaTalk system, you can provide power either through SeaTalk (as shown below) or direct from the distribution panel.



Tools required

- drill and 3 mm ($\frac{1}{8}$ in) drill bit
- cross-head/pozi-drive screwdriver
- small flat-bladed screwdriver (for GyroPlus 2 unit terminals)
- wire-strippers
- hand bearing compass (to help identify suitable fluxgate location)

Parts required



Additional parts required

In addition to the parts supplied you may also require:

- suitable 2-core cable for NMEA output to Pathfinder Plus
- suitable power cable and 3 A fuse/circuit breaker (if required)
- additional SeaTalk cables (if required)

Cabling guidelines

When running cables, always observe the following guidelines:

- if a cable has to be fed through the deck, use a good quality deck gland
- where cables are fed through holes, use grommets to prevent chafing
- secure long cable runs so they do not present a hazard
- wherever possible, route cables away from fluorescent lights, engines and radio transmitting equipment, as these may cause interference

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.

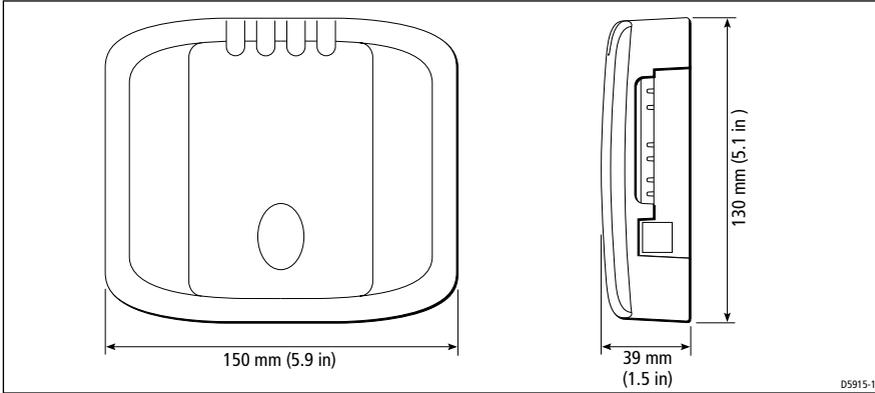
The guidelines given here describe the conditions for optimum EMC performance, but it is recognized that it may not be possible to meet all of these conditions in all situations. To ensure the best possible conditions for EMC performance within the constraints imposed by any location, always ensure the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

For **optimum** EMC performance, we recommend that **wherever possible**:

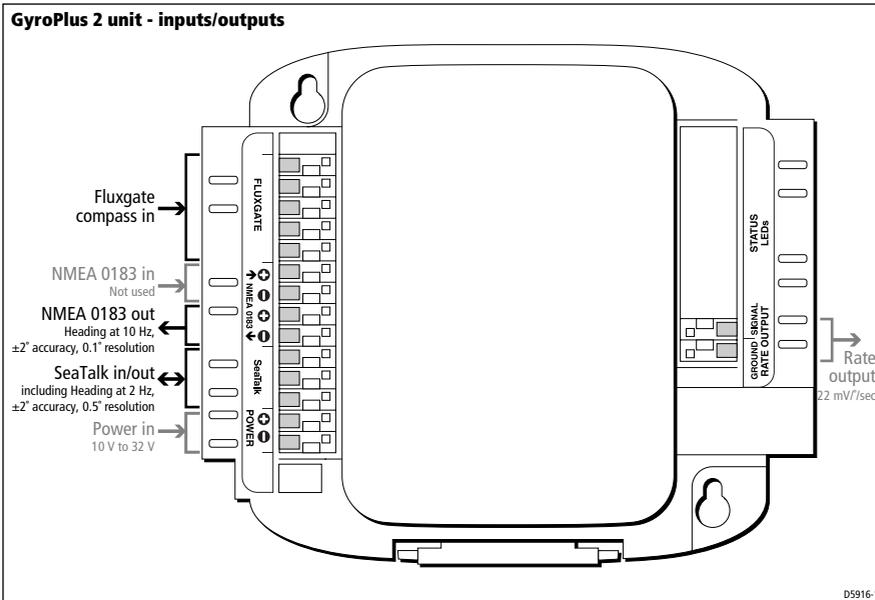
- Raymarine equipment and cables connected to it are:
 - At least 1 m (3 ft) from any equipment transmitting or cables carrying radio signals e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 2 m (7 ft).
 - More than 2 m (7 ft) from the path of a radar 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, 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.

2.2 Installing the GyroPlus 2 unit

GyroPlus 2 unit - dimensions



GyroPlus 2 unit - inputs/outputs



Site requirements

CAUTION:

The GyroPlus 2 unit is not waterproof, so it **MUST** be installed in a dry location away from water splash or spray from bilges, hatches, etc.

Mount the GyroPlus 2 unit below deck, in a dry location that is:

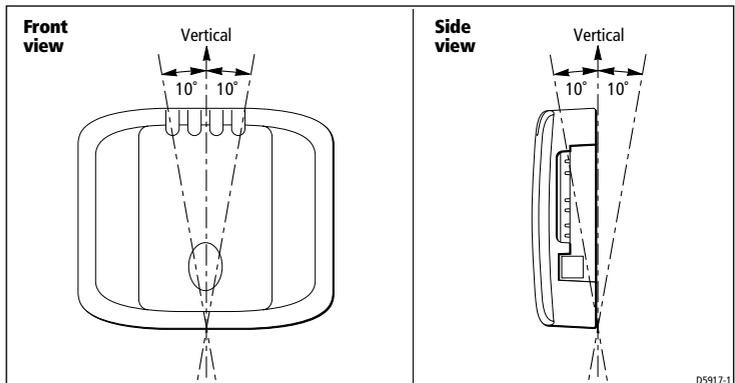
- vertical (see below)
- protected from excessive vibration and excessive temperatures: engine room mounting is not recommended
- shielded from physical damage
- accessible for installation and servicing
- at least 230 mm (9 in) from any compass (including the fluxgate compass in the Smart Heading System)
- at least 500 mm (20 in) from any radio receiving equipment

Orientation

As the GyroPlus 2 unit measures the boat's rate of turn, it is important to mount it on a **vertical** surface (as shown). If necessary, make up a suitable wedge-shaped packing piece to provide a vertical surface. Make sure you mount the unit the correct way up (as indicated on the mounting label) – with the power inputs at the bottom left.

CAUTION:

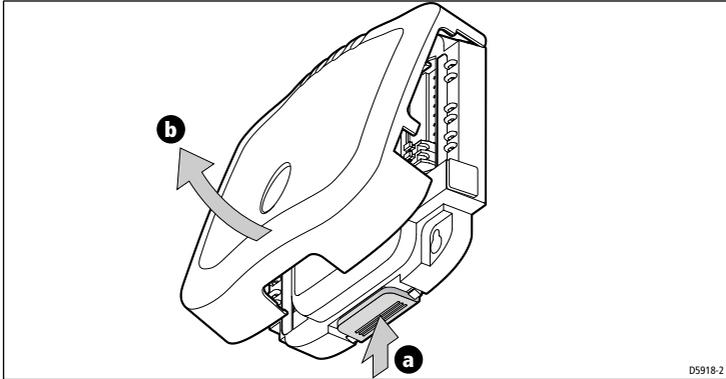
For the GyroPlus 2 unit to work accurately, you must mount it within **+/- 10° of the vertical**. For optimum performance, mount the GyroPlus 2 unit so it is as close as possible to vertical.



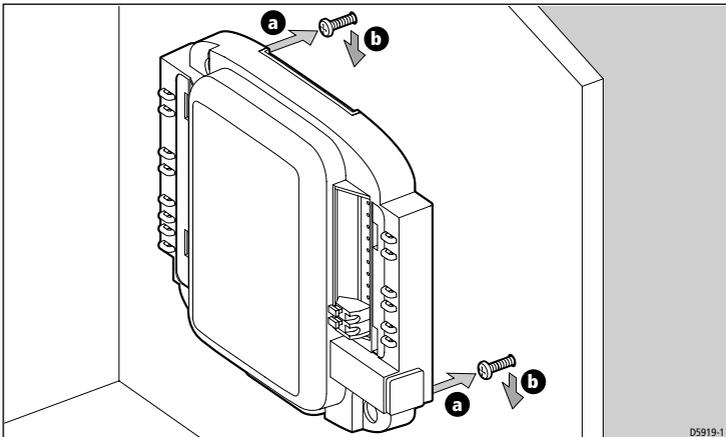
Mounting the GyroPlus 2 unit

Fit the GyroPlus 2 unit to the vertical surface as follows:

1. Remove the outer cover (as shown below).



2. Temporarily hold the GyroPlus 2 unit in the required position so you can mark the centers of the two fixing holes.
3. Use a 3 mm ($\frac{1}{8}$ in) drill bit to make two pilot holes.
4. Screw one of the self-tapping screws provided (No 8 x 1 in) into each hole, so each screw-head is at least 15 mm from the surface.
5. Place the fixing holes over the screw heads, then move the GyroPlus 2 unit down so the screw heads are at the top of the keyhole slots.



6. Tighten the screws to secure the GyroPlus 2 unit.

Note: Replace the outer cover after you have connected all cables.

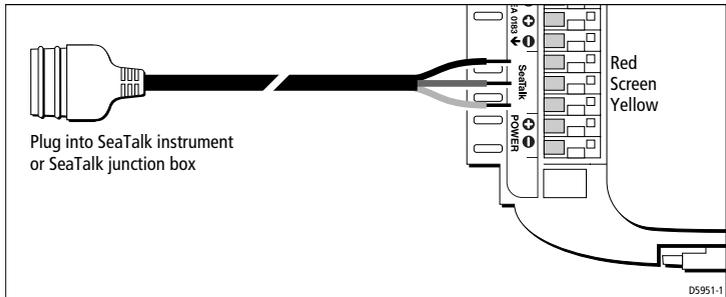
GyroPlus 2 unit - power supply

As described at the start of this Chapter, you can provide power to the GyroPlus 2 unit either:

- via SeaTalk (12 V)
or
- direct from your boat's distribution panel (12 V or 24 V): using suitable cable protected with a 3 A in-line fuse or equivalent circuit breaker

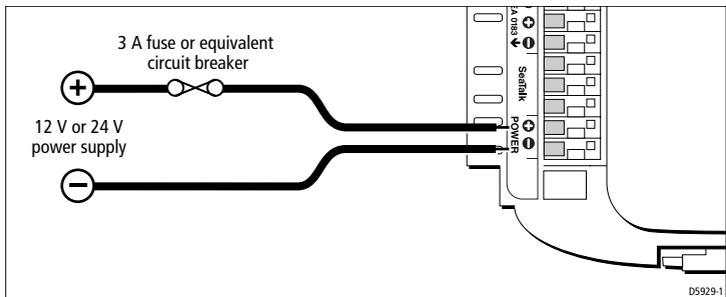
Note: *If you connect power to both the **SeaTalk** terminals and the **POWER** terminals, the GyroPlus 2 unit will power up when either or both of these is switched on.*

Power from SeaTalk



Note: *Secure the SeaTalk cable to the loops on the GyroPlus 2 unit with one of the supplied cable ties.*

Power from distribution panel



Note: *Secure the power cabling to the loops on the GyroPlus 2 unit with one of the supplied cable ties.*

2.3 Installing the fluxgate compass

Fluxgate compass - description and dimensions

The fluxgate compass contains a self-levelling mechanism. This enables the compass to provide accurate readings with pitch and roll movements up to $\pm 35^\circ$.

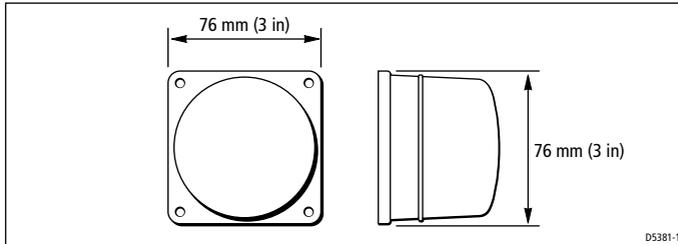


Figure 2-1: Fluxgate compass dimensions

Note: *The rattle that the fluxgate compass makes when shaken is normal. It is caused by the pendulum weight hitting a buffer inside of the case.*

Select the location

The compass is primarily designed for mounting below deck on a vertical bulkhead.

Note: *On steel boats the Fluxgate Compass should be mounted above deck (see page 13).*

Standard location

To achieve the best performance from the compass, mount it:

- as near as possible to the boat's pitch and roll center to minimize compass disturbance (as shown in the shaded areas in *Figure 2-2*)
- at least 0.8 m (2 ft 6 in) away from the boat's steering compass to prevent deviation of either compass
- away from the front third of the boat (otherwise shock motion will affect compass performance)
- away from potential sources of magnetic interference, such as: motors, drive units, loudspeakers, alternators/starters, electric cables, large ferrous objects (such as engines, ballast, keel, gas bottles and tool boxes)

Note: Because the compass is electronically aligned after installation (see Chapter 3: Calibration), you can mount it so it faces in any direction.

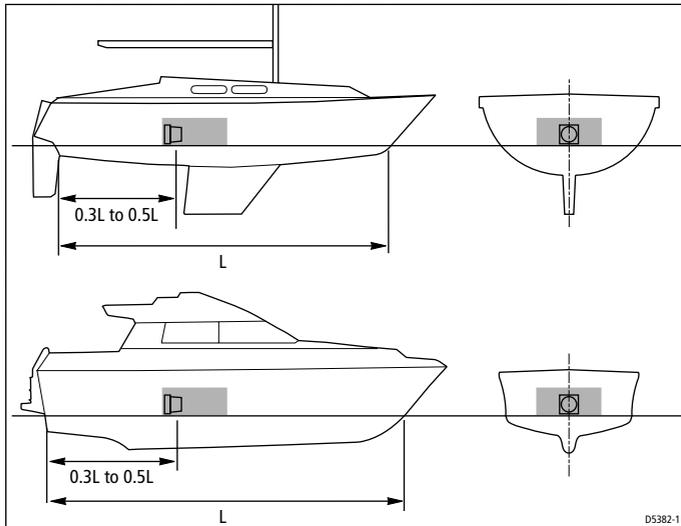


Figure 2-2: Compass - recommended location for non-steel hulls

Finding the most suitable location

To identify the best compass location on your boat, start at the pitch and roll center then move the compass up and/or aft until you find a location with minimal magnetic disturbance.

To check if the intended mounting location is free from magnetic influence:

1. Temporarily fix a simple handheld compass at the intended location.
2. Turn the boat through 360° , watching for any differences between the hand bearing compass and the boat's main steering compass.
3. The site is suitable for the fluxgate compass if the differences are less than 10° on all headings.

Location on steel-hulled boats

On steel-hulled boats you must mount the compass at least 1 m (3 ft) above the main deck or wheelhouse. If mounted below deck, the compass will not work correctly as the hull shields the Earth's magnetic field.

The following diagram shows recommended mounting positions for steel-hulled boats.

Note: *The higher above the waterline you mount the compass, the more the boat's pitch and roll will affect compass performance.*

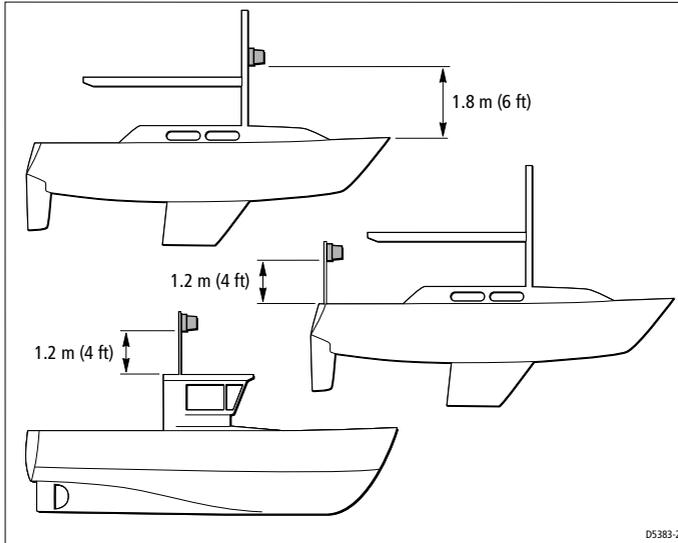


Figure 2-3: Compass - recommended location for steel-hulled boats

Mount the fluxgate compass

CAUTION:

You must mount the fluxgate compass vertically, with the cables exiting at the base.

1. Hold the fluxgate compass against the mounting location.
2. Mark the four mounting holes, then remove the fluxgate compass.
3. Drill four pilot holes using a 3 mm ($\frac{1}{8}$ in) drill bit.
4. Making sure the cable exits at the bottom, secure the fluxgate compass using four of the self-tapping screws provided (No 8 x 1 in).

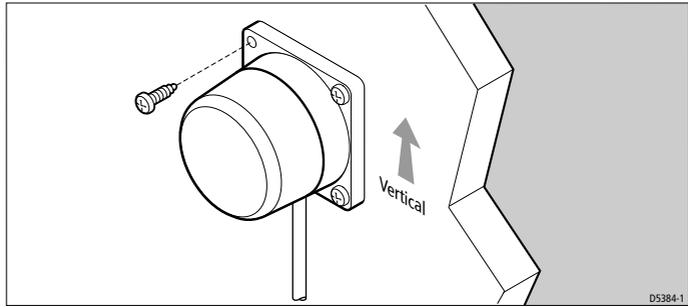


Figure 2-4: Fluxgate compass - orientation

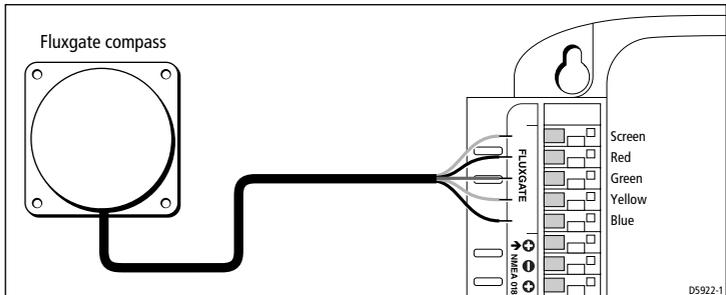
Note: Stick the supplied warning label near to the fluxgate compass, where it is clearly visible.

Connect the fluxgate compass to the GyroPlus 2 unit

1. The fluxgate compass is supplied with 8 m (26 ft) of cable. Route the cable to the GyroPlus 2 unit, taking into account the EMC installation guidelines (see page 7).

Note: Make sure you leave some spare cable so, if necessary, you can re-position the compass to reduce deviation.

2. Connect the five cores of the cable to the **FLUXGATE** terminals on the GyroPlus 2 unit (as shown).



3. Secure the compass cable to the loops on the GyroPlus 2 unit with one of the supplied cable ties.

2.4 Connecting to Pathfinder Plus

You need to connect the GyroPlus 2 unit to the Pathfinder Plus using **both** NMEA and SeaTalk:

- the SeaTalk connection allows the Pathfinder Plus unit to **calibrate** the compass
- the NMEA connection provides the **fast heading** information for MARPA and radar/chart overlay

SeaTalk connections

Use the supplied SeaTalk cable to connect the GyroPlus 2 unit to the Pathfinder Plus unit:

- insert the bare ends into the appropriate color-coded **SeaTalk** terminals on the GyroPlus 2 unit
- secure the SeaTalk cable to the loops on the GyroPlus 2 unit with one of the supplied cable ties
- insert the SeaTalk plug into the socket on the Pathfinder unit or into a SeaTalk junction box already connected to the Pathfinder unit

NMEA connections

Use a suitable cable to connect the **NMEA out** terminals on the GyroPlus 2 unit to the Pathfinder Plus unit's Power/NMEA cable.

Secure the NMEA cabling to the loops on the GyroPlus 2 unit with one of the supplied cable ties.

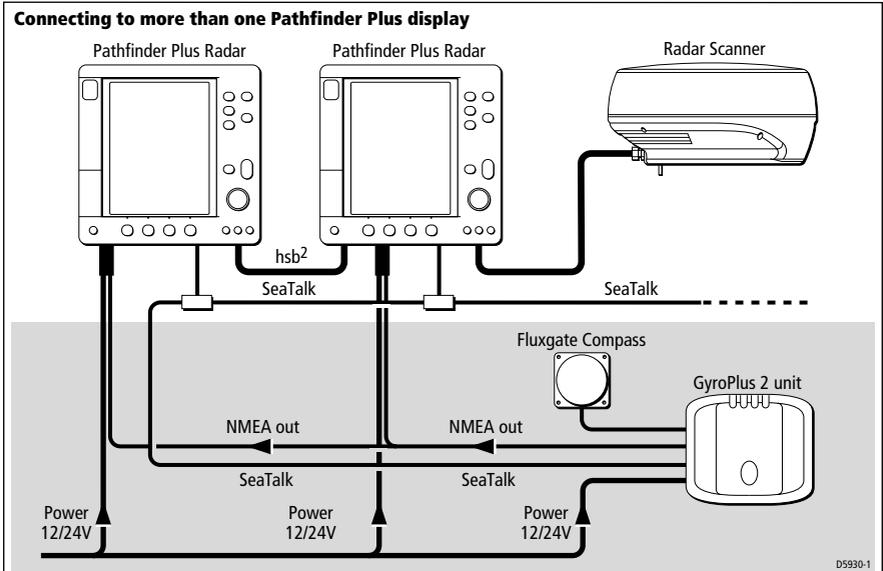
GyroPlus 2 unit outputs	connect to	Pathfinder Plus cable inputs
NMEA output + (GREEN)	➔	Channel 2 NMEA data input + (GREEN)
NMEA output - (BLUE)	➔	Channel 2 NMEA return - (BLUE)

Note: *If necessary you can use the Channel 1 NMEA inputs on the Pathfinder Plus cable. Refer to the Pathfinder Plus owner's handbook for more information.*

Connecting to more than one Pathfinder Plus unit

You can use the **NMEA out** terminals on the GyroPlus 2 unit to supply fast heading information to up to ten Pathfinder Plus units (depending on the length of NMEA cable run).

To use MARPA and radar/chart overlay on all units you will need to connect **each Pathfinder Plus unit directly to the NMEA out terminals** on the GyroPlus 2 unit, so they receive fast heading data.



Chapter 3: Calibration

CAUTION:

If you fail to complete calibration, the performance of the Smart Heading System will be impaired on some compass headings.

This chapter explains how to calibrate the Smart Heading System using a Pathfinder Plus display. This chapter contains the following sections:

Section	Page
Section 3.1, Compass calibration overview	page 19
Section 3.2, Calibrating with a Pathfinder Plus display	page 20

Note: *The Pathfinder Plus display must contain software release 2 (or later) to enable the compass calibration feature. Contact your Raymarine dealer if you need more information or a software upgrade.*

Note: *You can also calibrate the compass system using a Raymarine autopilot (see the Appendix).*

3.1 Compass calibration overview

When you have completed installation, you must take the boat on a short seatrial to calibrate the Smart Heading System. This involves:

- linearising the compass – to reduce errors caused by deviating magnetic fields on your boat
- aligning the heading – so the heading from the Smart Heading System matches a known reference

You should **only** perform the initial seatrial:

- in conditions of light wind and calm water
- in waters that are clear of any obstructions, so the boat has plenty of clear space to maneuver

Note: *If you have a GPS connected to your Pathfinder Plus, make sure you switch it on so you can align your compass heading to COG (course over ground).*

CAUTION: EMC conformance

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

3.2 Calibrating with a Pathfinder Plus display

Step 1: Enter Compass Setup mode

1. Press the **MENU** button.
2. Press the **SYSTEM SET UP** soft key. You will then see the **SYSTEM SET UP MENU**.
3. Select **COMPASS SET UP** from the menu:
 - **COMPASS SETUP** is not visible when you first access the **SYSTEM SET UP MENU** – you will need to scroll down the list
 - use the trackpad to move to the bottom item in the box, then continue moving down the list to select **COMPASS SET UP**
4. Press the **COMPASS SET UP** soft key. You will then see the **COMPASS SET UP** box.

COMPASS SET UP	
HEADING	247° M
COG	186° M
SOG	2.5 kts
CORRECTED DEVIATION	---°

D5952-1

The **COMPASS SET UP** box contains four items:

- **HEADING** = the current heading from the Smart Heading System (if there is no heading figure displayed, check your compass connections)
- **COG** = Course Over Ground heading from GPS (if connected)
- **SOG** = Speed Over Ground from GPS (if connected)
- **CORRECTED DEVIATION** = the amount of deviation corrected during compass linearisation

At this stage, because you have not calibrated the Smart Heading System:

- **HEADING** and **COG** will differ
- **CORRECTED DEVIATION** will show dashes instead of a value

Note: Press **ENTER** or **CLEAR** if you need to return to the **SYSTEM SETUP MENU** at any time.

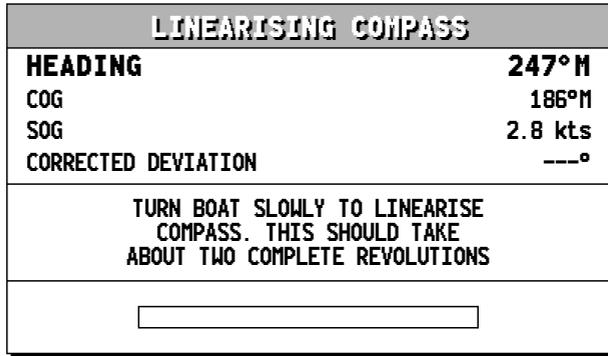
Step 2: Linearise the compass



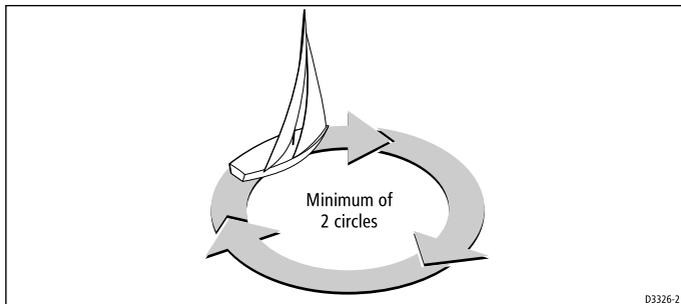
1. Press the LINEARISE COMPASS soft key to start the linearising process.

Note: *If you see a WARNING - COMPASS NOT CONNECTED message, check your Smart Heading System connections.*

2. You will then see the LINEARISING COMPASS box.



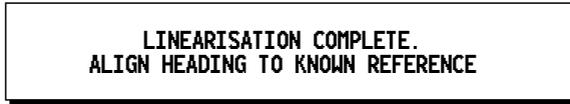
3. Start turning the boat in circles with the boat speed below 2 knots. You will need to complete about two circles, taking at least 2 minutes to complete each 360°. The bar will indicate how much of the linearisation is complete.



Note: *If you turn the boat too quickly, you will see WARNING: TURNING TOO FAST - SLOW DOWN. Apply less helm to turn in a larger circle.*

Note: *Press the CANCEL LINEARISE soft key if you need to stop compass linearisation at any time. The display reverts to the COMPASS SET UP box, without retaining any deviation that has been calculated.*

- When compass linearisation is complete, the Pathfinder Plus unit will beep and briefly display the following pop-up message.



D5956-1

- You will then see the ALIGNING HEADING box, showing the corrected deviation.

Note: *If the deviation figure exceeds 15°, the fluxgate compass is being affected by ferrous objects on your boat. Move the fluxgate compass to a better location. Higher deviation figures are acceptable on steel boats.*

Step 3: Align the heading

ALIGNING HEADING	
HEADING	247°M
COG	185°M
SOG	3.0 kts
CORRECTED DEVIATION	005°
LINEARISATION COMPLETE. ALIGN HEADING TO KNOWN REFERENCE	

D5957-1

Align to COG (if available)

Note: *If COG is not available, proceed to 'Fine-tune the alignment'.*

- Manually steer the boat on a steady course at a speed which enables you to hold that course.
- If you have a GPS connected to your Pathfinder Plus:
 - hold the boat on a straight course and increase the boat speed to more than 3 knots, then wait about 30 seconds for COG to stabilize on an accurate course



D5958-1

- press the ALIGN TO COG soft key: the HEADING value will then be aligned to the COG (course over ground) heading received from the GPS and you will see the following pop-up message



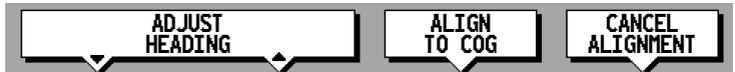
D5959-1

- expect some difference between COG and the heading when the boat turns

Note: *If you press ALIGN TO COG when the SOG is less than 3 knots you will see the warning message: SOG TOO LOW. CANNOT ALIGN TO COG. Increase the boat's speed then press ALIGN TO COG again.*

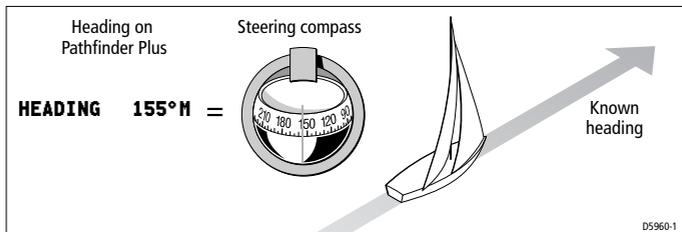
3. Because many factors (such as tides and leeway affecting the boat) can make the actual heading differ from COG, you may then need to fine-tune the heading alignment (see below).

Fine-tune the alignment



D5958-1

1. Use the ADJUST HEADING soft keys to adjust the displayed heading so it matches the boat's steering compass or a known transit bearing.



D5960-1

2. Save the aligned heading by pressing the **ENTER** or **CLEAR** key to return to the COMPASS SETUP menu.

Note: *If you do not want to save the new aligned heading, press CANCEL ALIGNMENT to return to the COMPASS SETUP menu and restore the previous heading value.*

3. Then press **ENTER** or **CLEAR** key twice to return to normal operation.

Chapter 4: Fault-finding & Maintenance

All Raymarine products are designed to provide many years of trouble-free operation. We also put them through comprehensive testing and quality assurance procedures before shipping.

Regular checks

CAUTION:

The GyroPlus 2 unit and fluxgate compass do NOT contain user-serviceable parts. They should be serviced only by authorized Raymarine service technicians.

On a regular basis:

- check that all connections and mountings are secure/undamaged
- check the system components for any signs of physical damage or water damage

Note: Do **not** use chemical or abrasive materials to clean the GyroPlus 2 unit cover or fluxgate compass case. If they are dirty, wipe them with a clean, damp cloth.

Fault-finding

Status LEDs

The GyroPlus 2 unit has two status LEDs just above the Rate outputs. These light-up during normal operation and flash to indicate compass/gyro faults:

Normal operation	
On power-up	Both LEDs on for 3 sec
Turn to port	Red LED on whilst turning
Turn to starboard	Green LED on whilst turning
Stationary	Both LEDs off
Fault-finding	
Red LED flashing	Compass fault - check connections
Green LED flashing	GyroPlus 2 unit fault - contact Raymarine Technical Services

Servicing

EMC, servicing and safety guidelines

- Raymarine equipment should be serviced only by authorized Raymarine service technicians. They will ensure that service procedures and replacement parts used will not affect performance. There are no user serviceable parts in any Raymarine product.
- Some products generate high voltages: never handle the cables/connectors when power is being supplied to the equipment.
- When powered up, all electrical equipment produces electromagnetic fields. These can cause adjacent pieces of electrical equipment to interact with one another, with a consequent adverse effect on operation. In order to minimize these effects and enable you to get the best possible performance from your Raymarine equipment, guidelines are given in the installation instructions, to enable you to ensure minimum interaction between different items of equipment, i.e. ensure optimum Electromagnetic Compatibility (EMC).
- Always report EMC-related problems to your nearest Raymarine dealer. We use such information to improve our quality standards.
- In some installations, it may not be possible to prevent the equipment from being affected by external influences. In general this will not damage the equipment but it can lead to spurious resetting action, or momentarily may result in faulty operation.

Product support

Raymarine products are supported by a worldwide network of distributors and Authorized Service Representatives. If you encounter any difficulties with this product, please contact either your national distributor, or your service representative, or the **Raymarine Technical Services Call Center**. Refer to the back cover or the Worldwide Distributor List for contact details.

Appendix: Connecting to Autopilots

The information in this Appendix explains how to connect the GyroPlus 2 unit to the following Raymarine autopilot systems:

- connecting to T150 or T400 course computers (Section A.1)
- integrating with other Raymarine autopilots (Section A.2)
 - ST4000+ or ST5000+ autopilot (see page 30)
 - T100 or T300 course computer (see page 31)

A.1 Connecting to T150 or T400 course computers

Connecting the GyroPlus 2 unit to a T150/T400 upgrades the course computer so it has the same functions as a 150G/400G:

- ‘AST’ (Advanced Steering Technology) is enabled, providing enhanced course keeping and FastTrim
- AutoLearn is enabled, providing automatic steering calibration when used with a ST6001+ or ST7001+ autopilot control unit
- the course computer NMEA 1 port will transmit 10 Hz fast heading, suitable for MARPA and radar/chart overlay on Pathfinder Plus units

Connecting to T150/T400 course computer

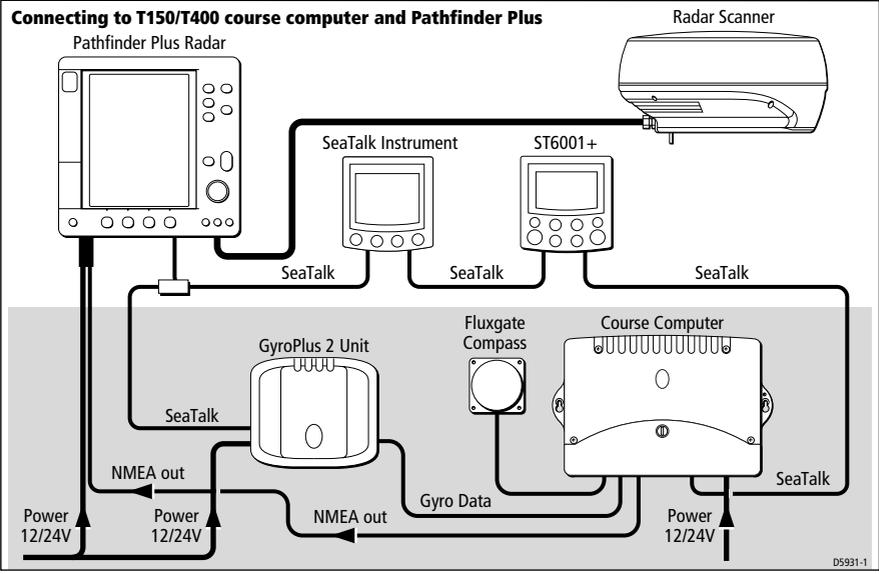
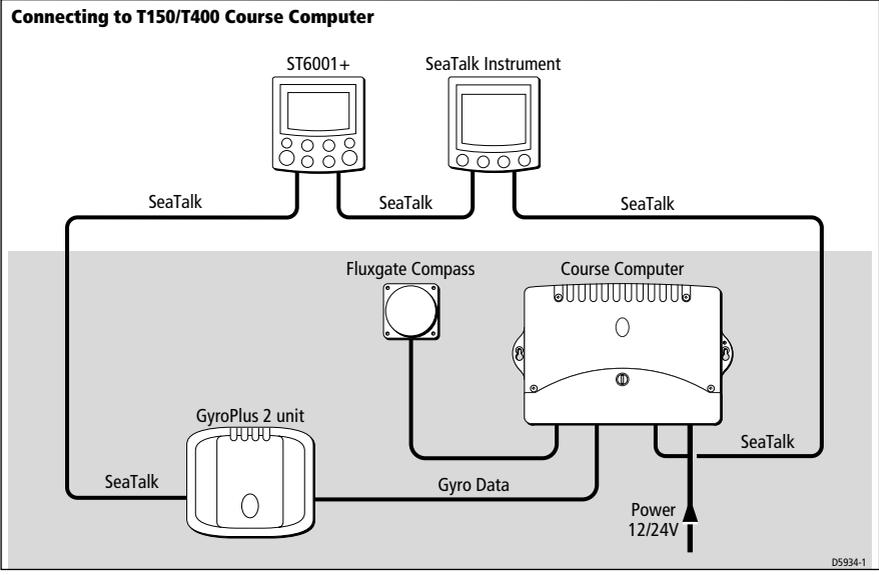
To connect the GyroPlus 2 unit to a T150/T400:

- leave the autopilot fluxgate compass connected to the T150/T400
- power the GyroPlus 2 unit via SeaTalk
- connect its **RATE OUTPUT** to **RATE GYRO** inputs on the T150/T400

Connecting to T150/T400 course computer and Pathfinder Plus

To connect the GyroPlus 2 unit to a T150/T400 course computer and also a Pathfinder Plus:

- leave the autopilot fluxgate compass connected to the T150/T400
- connect the **RATE OUTPUT** on the GyroPlus 2 unit to the **RATE GYRO** inputs on the T150/T400
- power the GyroPlus 2 unit from **both** SeaTalk and the distribution panel:
 - provide power from SeaTalk so the GyroPlus 2 unit receives power when the course computer is powered up but the Pathfinder is off
 - provide power from the same switch as the Pathfinder Plus so the GyroPlus 2 unit receives power when the Pathfinder is powered up but the course computer is off
- connect the **NMEA 1 outputs** on the course computer to the NMEA inputs on the Pathfinder Plus



Installation instructions for T150/T400

Fluxgate compass

Leave the compass connected to course computer **FLUXGATE** inputs.

Installing the GyroPlus 2 unit

Follow the installation instructions for the GyroPlus 2 unit in Chapter 2.

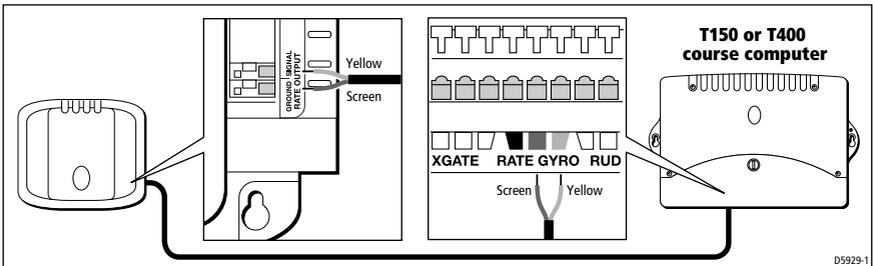
CAUTION:

If you are using the Smart Heading System as the primary heading reference for an autopilot, you must ensure that it receives power (via SeaTalk or direct from the distribution panel) when the autopilot is switched on.

Connecting the Rate Output

Connect the **RATE OUTPUT** on the GyroPlus 2 unit to the **RATE GYRO** inputs on T150/T400.

GyroPlus 2 unit outputs	connect to	Course computer inputs
Rate output GROUND (GREY)	➔	GREY
Rate output SIGNAL (YELLOW)	➔	YELLOW
	✘	RED - DO NOT CONNECT



Calibration

You do **not** need to re-calibrate the autopilot fluxgate compass after connecting the GyroPlus 2 unit to the T150/T400.

Note: If you need to calibrate the fluxgate compass for any reason in the future, follow the procedures in the autopilot owner's handbook.

A.2 Integrating with other Raymarine autopilots

If you already have a Raymarine fluxgate compass mounted in a suitable location as part of your autopilot system (not T150/T400), you need to:

- install GyroPlus 2 unit and connect the existing SeaTalk system to the **SeaTalk** terminals on the GyroPlus 2 unit
- **re-route the compass cable** and connect it to the **FLUXGATE** inputs on the GyroPlus 2 unit
- use the autopilot control head or Pathfinder Plus to **re-calibrate** the compass (see either the autopilot owner's handbook or *Chapter 3: Calibration* in this handbook for more details)

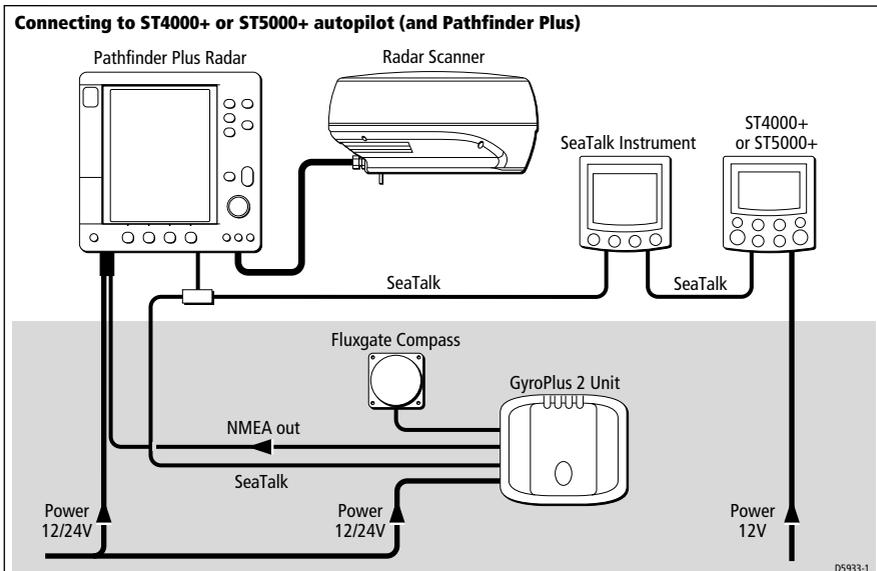
The GyroPlus 2 unit will then output:

- an accurate, stabilized heading on SeaTalk for the autopilot
- fast heading data on NMEA for the Pathfinder Plus functions

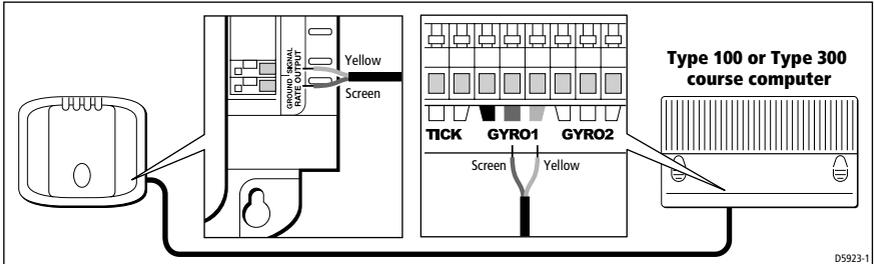
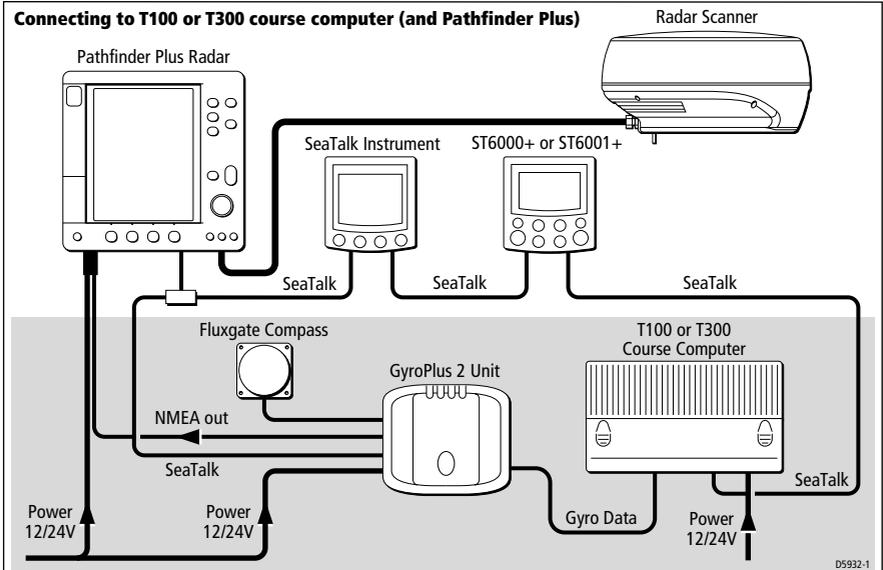
CAUTION:

If you are using the Smart Heading System as the primary heading reference for an autopilot, you must ensure that it receives power (via SeaTalk or direct from the distribution panel) even if the Pathfinder Plus is switched off.

Connecting to ST4000+ or ST5000+ autopilot



Connecting to T100 or T300 course computer



Connecting to Autopilots

Specifications

GyroPlus 2 unit

Nominal supply voltage: 12 V or 24 V DC

Operating voltage range: 10 V to 32 V DC

Power consumption (max): 130 mA

Operating conditions:

temperature range	-10°C to 55°C (14°F to 131°F)
relative humidity limit	80%
water protection	drip resistant when mounted vertically

Storage conditions:

temperature range	-5°C to 60°C (23°F to 140°F)
relative humidity limit	75%

Dimensions:

width	150 mm (5.9 in)
height	130 mm (5.1 in)
depth	39 mm (1.5 in)

Weight: 0.27 kg (9.5 oz)

Inputs:

- fluxgate compass
- SeaTalk
- power
- service port (NMEA 0183 v2.3 in)

Outputs:

- NMEA 0183 v2.3 out: Heading (HDM) 10 Hz at 0.1° resolution, accurate to $\pm 2^\circ$
NMEA Heading sentence: \$APHDM,XXX.X,M*hh<CR><LF>
- SeaTalk (2 Hz, including Heading at 0.5° resolution, accurate to $\pm 2^\circ$)
- Analogue Rate: 22 mV°/sec

Heading error correction:

- compensates for 1st and 2nd harmonic deviation errors
- eliminates northerly turning error

CE approvals - conforms to: 89/336/EC (EMC), EN60945:1997

Limited Warranty Certificate

Raymarine warrants each new Light Marine/Dealer Distributor Product to be of good materials and workmanship, and will repair or exchange any parts proven to be defective in material and workmanship under normal use for a period of 2 years/24 months from date of sale to end user, except as provided below.

Defects will be corrected by Raymarine or an authorized Raymarine dealer. Raymarine will, except as provided below, accept labor cost for a period of 2 years/24 months from the date of sale to end user. During this period, except for certain products, travel costs (auto mileage and tolls) up to 100 round trip highway miles (160 kilometres) and travel time of 2 hours, will be assumed by Raymarine only on products where proof of installation or commission by authorized service agents, can be shown.

Warranty Limitations

Raymarine Warranty policy does not apply to equipment which 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.

Except where Raymarine or its authorized dealer has performed the installation, it assumes no responsibility for damage incurred during installation.

This Warranty does not cover routine system checkouts or alignment/calibration, 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: Chart paper, lamps, fuses, batteries, styli, stylus/drive belts, radar mixer crystals/diodes, snap-in impeller carriers, impellers, impeller bearings, and impeller shaft) are specifically excluded from this Warranty.

Magnetrons, Cathode Ray Tubes (CRT), TFT Liquid Crystal Displays (LCD) and cold cathode fluorescent lamps (CCFL), hailer horns and transducers are warranted for 1 year/12 months from date of sale. These items must be returned to a Raymarine facility.

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 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 MERCHANTABILITY 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.

Raymarine

Factory Service Centers

United States of America

Raymarine Inc
22 Cotton Road, Unit D
Nashua, NH 03063-4219, USA

Telephone: +1 603 881 5200
Fax: +1 603 864 4756
www.raymarine.com

Sales & Order Services

Telephone: +1 800 539 5539 Ext. 2333 or
+1 603 881 5200 Ext. 2333

Technical Support

Telephone: +1 800 539 5539 Ext. 2444 or
+1 603 881 5200 Ext. 2444
Email: techsupport@raymarine.com

Product Repair Center

Telephone: +1 800 539 5539 Ext. 2118

UK, Europe, Middle East, Far East

Raymarine Ltd
Anchorage Park, Portsmouth
PO3 5TD, England

Telephone: +44 (0)23 9269 3611
Fax: +44 (0)23 9269 4642
www.raymarine.com

Customer Support

Telephone: +44 (0)23 9271 4713
Fax: +44 (0)23 9266 1228

Email: techsupport@raymarine.com

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.