

# INSTRUCTION MANUAL

## Simrad AP51 Remote Control



[AB]



[20221016]

### **Note!**

*Simrad AS makes every effort to ensure that the information contained within this document is correct. However, our equipment is continuously being improved and updated, so we cannot assume liability for any errors which may occur.*

### **Warning!**

*The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.*

*Simrad AS disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.*

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# ***Instruction Manual***

This manual is intended as a reference guide for operation of the Simrad AP51 Remote Control.

Great care has been taken to simplify the set-up and operation of the AP51; however, an autopilot is a complex electronic system. It is affected by sea conditions, speed of the vessel, and vessel hull shape and size.

Please take the time to read this manual to get a thorough understanding of the Simrad AP50 autopilot's system components and operations as well as their relationship to a complete AP50 autopilot system.

Other documentation included in this manual is a warranty card. This card must be completed by the authorized dealer that performed the installation and mailed-in to activate the warranty.

## **Caution**

***An autopilot is a very useful navigational aid, but it DOES NOT under any circumstance replace a human navigator.***

***Do not use automatic steering when:***

- ***In heavy traffic areas or in narrow waters***
- ***In poor visibility or extreme sea conditions***
- ***When in areas where use of autopilot is prohibited by law***

***When using an autopilot:***

- ***Do not leave the helm unattended***
- ***Do not place any magnetic material or equipment near any magnetic or fluxgate compass used in the autopilot system***
- ***Verify the course and position of the vessel at regular intervals***
- ***Always switch to Standby mode and reduce speed in sufficient time to avoid hazardous situations***

## Document revisions

Rev	Date	Written by	Checked by	Approved by
A	12.06.02	NG	GK	TR
B	18.06.03	NG	<i>G.K.</i>	<i>V.P.</i>

## Document history

Rev. A Original Issue

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# 1 GENERAL INFORMATION

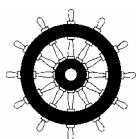
## 1.1 Introduction

Congratulations on the purchase of your new Simrad AP50 autopilot system and thank you for selecting what we feel is one of the most advanced autopilot system available on the market today.

Today, Simrad manufactures a complete range of autopilots for all types of vessels, from leisure boats to advanced steering systems for merchant marine vessels. Our factory for these products Simrad Egersund AS, is located in Egersund on the southwest coast of Norway. The company's involvement in autopilots began in 1953 with equipment for the North Sea fishing fleet under the brand name Robertson. Professional mariners around the world acknowledge that the Robertson and Simrad brand names are synonymous with the absolute best in autopilot technology.

The AP50 autopilot system from Simrad represents yet another step forward in autopilot technology with the intent of providing small fishing boats and work boats up to 200 feet with a host of new features. The system can be expanded and enhanced with a selection of options and accessories.

The brain in the AP50 autopilot system is the single "intelligent" junction unit that communicates with all other system modules on a RobNet network. The RobNet has been developed to establish a reliable digital communication and power distribution network between the units in the system. The ROBNET simplifies installation and enables the AP50 system to be easily expanded at any time. Any unit that is connected to the autopilot system via RobNet is called a RobNet Unit.



The AP50 system is produced and tested in accordance with the European Marine Equipment Directive 96/98. This means that the AP50 complies with the highest level of tests for non-military marine electronic navigation equipment existing today.

The Marine Equipment Directive 96/98/EC (MED), as amended by 98/95/EC for ships flying EU or EFTA flags, applies to all new ships, to existing ships not previously carrying such equipment, and to ships having their equipment replaced.

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

While the AP50 system may be installed on vessels not needing to comply with the Marine Equipment Directive, those requiring compliance must have one AP50 Control Unit set-up as “master unit” in order for the installation to be approved. Simrad has no responsibility for the incorrect installation or use of the AP50 autopilot, so it is essential for the person in charge of the installation to be familiar with the relevant requirements as well as with the contents of the AP50 manual. This manual covers correct use of AP51 Remote Control.

The purpose of the Marine Equipment Directive is to enhance safety at sea and to prevent marine pollution through the uniform application of the relevant international instruments relating to equipment listed in Annex A1.

As there are many interfacing requirements in the standards/codes, integrated systems and integrated certification lead to more efficient and effective management of safety, environmental issues, and quality.

The Marine Equipment Directive also constitutes a part of the International Safety Management (ISM) Code. The ISM Code was included as a new chapter (IX) of SOLAS in 1994, and is mandatory for: passenger ships not later than 1<sup>st</sup> of July, 1998; oil tankers; chemical tankers; gas carriers; bulk carriers and cargo high speed craft of 500 gross tonnage and upwards not later than 1<sup>st</sup> of July, 1998; and other cargo ships and mobile offshore drilling units of 500 gross tonnage and upwards not later than 1<sup>st</sup> of July, 2002.

It is required that both the shipping company and ships shall be certified by the Administration (the government of the state whose flag the ship is entitled to fly), by an organization recognized by the Administration, or by the government of the country acting on behalf of the Administration.

## **1.2 How to Use This Manual**

This manual is intended as a reference guide for operating the Simrad AP51 Remote Control. Great care has been taken to simplify the set-up and operation of the AP51; however, an autopilot is a complex electronic system. It is affected by sea conditions, speed of the vessel, and vessel hull shape and size.

Please take the time to read this manual to get a thorough understanding of the Simrad AP50 autopilot's system components and operation as well as their relationship to a complete AP50 autopilot system.



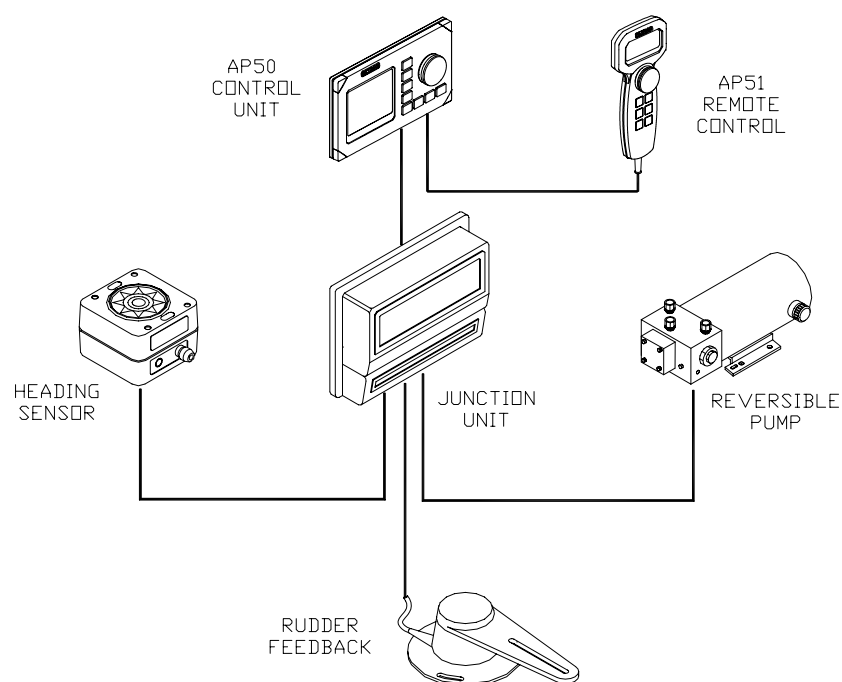
At the end of this manual, you will find an index and a glossary, which will help you when studying the manual.

## 1.3 System Components

A basic AP50 system may consist of the following units (refer to Figure 1-1):

- AP50 Control Unit with accessories
- Heading sensor
- Rudder Feedback Unit with transmission link
- Junction Unit
- Drive Unit

The basic system can be expanded with remote control unit, hand held remote and steering lever.



**Figure 1-1 AP50 Basic system with AP51 Remote Control**

For more information about available system components, refer to the AP50 Instruction Manual.

## **1.4 AP51 Remote Control**

This portable remote control for AP50 with 7 m (20 ft.) of cable can be used as a hand held remote control or can be mounted in a fixed bracket-mount.

The JP21 Jack Point can be used for simple connection/disconnection of the AP51 at different locations on the vessel.

## 2 OPERATION OF AP51 REMOTE CONTROL

### Caution

*An autopilot is a very useful navigational aid, but it DOES NOT under any circumstance replace a human navigator.*

*Do not use automatic steering when:*

- *In heavy traffic areas or in narrow waters*
- *In poor visibility or extreme sea conditions*
- *When in areas where use of autopilot is prohibited by law*

*When using an autopilot:*

- *Do not leave the helm unattended*
- *Do not place any magnetic material or equipment near the magnetic or fluxgate compass used in the autopilot system*
- *Verify the course and position of the vessel at regular intervals*
- *Always switch to Standby mode and reduce speed in sufficient time to avoid hazardous situations*

### 2.1 Overview

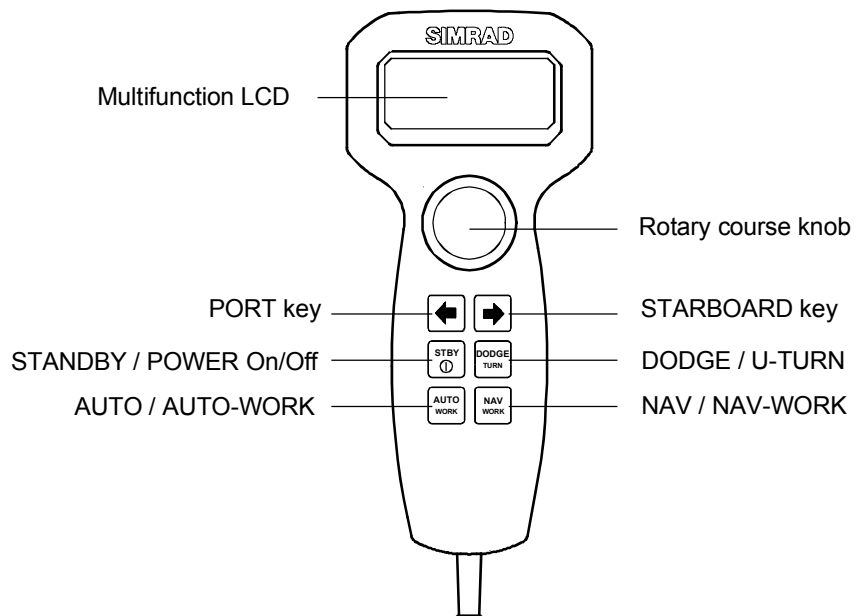


















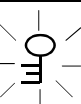






Figure 2-1 AP51 Remote Control Front Panel

Buttons	Action	Function
	Short press: Second short press: Long press (3 sec.):	Switches the system on (only in non-Wheelmark installation). Selects STANDBY mode. Alters between the two STANDBY displays. Switches the system off (only in non-Wheelmark installation).
	Single short press: Second short press: Long press (3 sec.): Quick double press:	Selects AUTO mode, sets heading reference = steering compass. Sets heading reference = steering compass. Selects/deselects WORK mode. Alters between the two AUTO displays.
	Short press: Quick double press: Long press (3 sec.): Second short press:	Selects NAV mode prompt screen. Verifies new course to steer when alert screen is shown. Selects User Set-up menu. Selects/deselects WORK mode. Alters between the two NAV displays.
	Short press: Long press (2 sec.): Second long press:	Activates Dodging. Activates U-turn prompt screen. Activates C-turn prompt screen.
	Press in STANDBY mode: Press in AUTO mode: Press in User Set-up:	Rudder moves to port while button is pressed. Adjusts course to port (1°, 5°, or 10°). Reverts to previous menu item.
	Press in STANDBY mode: Press in AUTO mode: Press in User Set-up:	Rudder moves to starboard while button is pressed. Adjusts course to starboard (1°, 5°, or 10°). Proceeds to next menu item.
	Press simultaneously	Activates Follow-up steering mode.

 Course knob	Rotate in FU-steering mode:	Sets commanded rudder angle.
	Rotate in AUTO mode:	Counter clock-wise = Port course change Clock-wise = Starboard course change
	Rotate in NAV mode:	Verifies new course to steer when alert screen is shown.
	Rotate in User Set-up:	Adjusts or confirms reading.

Screen Symbol	Description
	Rotate course knob
	Press  (PORT) or  (STBD) button
<b>04</b> 	Rudder angle 4° to starboard
<b>102</b>	Rudder angle 2° to port
	Rudder command to starboard
	Rudder command to port
	Thruster connected to autopilot system
	Control unit inactive or disengaged
	Control unit locked
	Key symbol alternates with mode index on unlocked master unit
	No course changes can be made unless you press the  (AUTO) button.
	Cross track error to starboard
	Boat turning to starboard

The AP51 Remote Control shown on page 9 can only operate as a remote control in an AP50 autopilot system or in a multistation system. In a multistation system, command can easily be transferred from one unit to another and units not in control will display "Inactive".

The autopilot system may also be disabled from the ships' steering system with an external switch. This will totally disengage the autopilot system from the ships' main/emergency steering system and the units will display "DISENGAGED".


The AP51 is capable of the following primary steering modes with each mode having a dedicated push button: STANDBY (FU-NFU), AUTO, NAV and DODGE. AUTO and NAV modes also have a sub-mode that is accessed by a long press on the AUTO or NAV button respectively. The AUTO-WORK and NAV-WORK sub-modes are used under operational conditions different from those normally found when a vessel is in transit on a preset course (e.g. trawling, towing, trolling on one engine, slow speed, using a thruster, etc.).

Each of the mode buttons is clearly identified with the primary function in large text and a secondary function listed in smaller text. Each button provides you with the ability to access a primary display, a secondary display, and/or multiple function displays.

A group of user-adjustable settings belonging to the selected mode are provided in the AP51 User Set-up Menu (see page 27). The settings allows adjustment of display visibility, selection of heading sensors, navigation and position sources, and the ability to select between automatically or manually adjustable sea state filter.

Alarms are presented in plain text to alert you to both system and external data failure conditions. Alarms include both audible and visual presentations. The alarms are listed on page 41

## 2.2 ON/OFF - Standby Mode (STBY)

A single press on the  (STBY) button switches the system ON (not in a Wheelmark system) and the following status displays are shown:

<p>Simrad AP51 SW V1R2 HW REV. 0</p>
--


Autopilot model  
Software V(ersion) and R(elease)  
Hardware revision

<p>Simrad J50 SW V1R2 P05 M01 S000</p>
--


Junction unit model  
Software V(ersion) and R(elease)  
Power board revision, Main board revision and Self check  
(SW and HW revisions shown are examples only)

After approximately 5 seconds, the system is operative and the unit that was turned on will show the STANDBY mode

display. Other units in a multistation system will display "Inactive". Control can be transferred to any single unit by pressing any of its' mode buttons (except in a Wheelmark system; see the Introduction on page 5).

A long press (3 sec.) on the  (STBY) button switches the system Off (not in a Wheelmark system). During this time the alarm will sound.

**Note !**

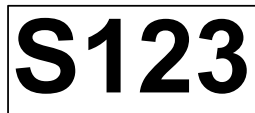
*In an emergency it is possible on a multistation system to turn OFF the system at any control unit by pressing down the  (STBY) button for 3 seconds (Except in a Wheelmark system where the system only can be turned off from the master control unit).*



STANDBY mode is used when steering the boat at the helm.

Display information:



- Standby mode
- Current heading from gyro 1: 123.5°
- Rudder angle: 6° to starboard





A second short press on the  (STBY) button alters between the two Standby displays.

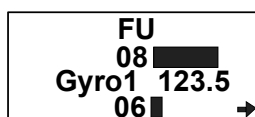


If a stepper or synchro gyro is connected to the autopilot system via the GI50 Gyro Interface, a display for the heading adjustment is presented before entering the Standby mode. Use the course knob to align the autopilot read-out to correspond with the gyro heading. Check the alignment every time the autopilot/gyro is switched on. If two stepper gyros are connected, both will simultaneously be aligned, one as steering compass and one as monitor compass.

Press the  (PORT) or  (STBD) button to proceed to Standby mode.

## 2.3 Follow-Up (FU) Steering

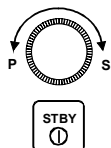
When both the  (PORT) and  (STBD) buttons are pressed simultaneously, the AP51 will enter Follow-Up steering mode and the course knob may be used to set rudder commands. One revolution of the knob equals a 45° rudder change. The rudder will move to the selected angle and stop.




Display information:

- Follow-Up mode
- Commanded rudder angle: 8° to starboard

- Current heading from gyro 1: 123.5°
- Rudder angle: 6° to starboard
- The small starboard arrow shows that the rudder is moving.



Use the course knob to select the rudder angle.



Return to manual control in Standby mode by pressing the  (STBY) button.

## WARNING

**While in Follow-Up mode, you cannot take manual control of the vessel unless you use the External Mode Selector.**

## 2.4 Non-Follow-Up (NFU) Steering



In STANDBY mode, the NFU display is presented when either the  (PORT) or  (STBD) button is pressed. The rudder will move as long as the button is pressed and the actual rudder angle is shown on the display. The small arrow shows that the rudder is moving.

Note !

*When a NFU steering lever or remote control is operated, the control unit(s) become "Inactive".*



## 2.5 Automatic Steering

### AUTO Mode

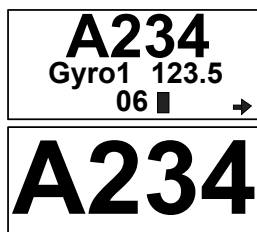


The AUTO mode is used to make the AP51 steer the vessel automatically on a set heading. AUTO mode is always available from any mode or function within the AP51 by a single push of the AUTO button. When AUTO mode is selected, the AP51 automatically selects the current vessel heading as the set heading and the rudder will move to midship position.

In AUTO mode, the AP51 issues rudder commands to keep the boat on the set heading. The boat heading is provided by the steering compass.

The AP51 will keep the boat on the set heading until a new mode is selected or a new heading is set with either the course knob, the (PORT) or (STBD) buttons, or by pushing the AUTO button again. One revolution of the knob equals a 45° course change.

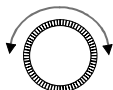
Once the course is changed to a new set heading, the boat will automatically turn to the new heading and continue to steer straight.



Display information:

- Automatic steering mode.
- Set heading: 234°
- Boat heading from gyrocompass: 123.5°
- Rudder angle: 6° to starboard and still moving.

A quick double press on the (AUTO) button alters between the two AUTO mode displays.



Rotate the course knob to change the course:

Clock-wise = Starboard course change

Counter Clock-wise = Port course change



Press the PORT or STBD button to adjust the course by 1°. It is possible to set the buttons to adjust the course by 5° or 10° per press in the AP50 Installation menu (refer to the AP50 Instruction Manual).



Press the AUTO button to select current vessel heading as set heading.



Press the STBY button to regain manual steering

## AUTO-WORK Mode


AUTO-WORK-mode is an automatic steering mode to be used under operational conditions different from those normally found when a vessel is in transit on a pre-set course. Examples are trawling, towing, trolling on one engine, slow speed, etc.



Long press

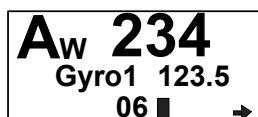
In such situations, some boats may need different settings. By pressing the AUTO-WORK button, a separate set of steering and turning values will be used. It can also be set how the rudder should move when entering AUTO-WORK from STANDBY or DODGE. Refer to the **W Init Rudder** setting in the AP50 manual.

When selecting WORK from any automatic mode and when changing between heading and route steering, the rudder offset is always maintained.

To manually change the **Trim**, quickly double press the  (NAV/SETUP) button (see AUTO-WORK mode in the User Set-up menu on page 29).

Note !

*If Thruster is selected under the Steering function in the User Set-up Menu, the thruster will be used when selecting WORK mode.*



Display information:

- AUTO-WORK mode
- Set heading in AUTO-WORK: 234°
- Boat heading from gyrocompass: 123.5°
- Rudder offset of 6° to starboard becomes the trim value

If you prefer to have complete manual control of the rudder trim in AUTO-WORK mode, the autotrim can be permanently disabled in the Installation Settings Menu (refer to the AP50 manual).

### Caution

***The Off Heading alarm is permanently disabled in AUTO-WORK mode.***

Note !

*Pair-trawling requires manual trim only, and the autotrim should be permanently disabled at the Installation Settings menu.*

## 2.6 Thruster Steering

If the vessel is equipped with a thruster, it can be connected to the AP50 system. The vessel can then be controlled by rudder, thruster, or both rudder and thruster (Steering function).

After connecting a thruster to the autopilot system (see the TI50 manual) the thruster type must be selected under the Installation Dockside menu (refer to the AP50 manual).

A thruster icon below the mode index indicates that a thruster is connected to the system.

Now you can select one of three control functions from the User Set-up Menu, Steering function:

- Rudder: The rudder is used to maintain the heading (always in AUTO mode and NAV mode).
- Thruster: The thruster is used to maintain the heading (only in AUTO-WORK, NAV-WORK, Follow-up, and Non-Follow-up steering modes).
- Rudder and Thruster: Both rudder and thruster are used to maintain the heading (only in AUTO-WORK mode, NAV-WORK mode, Follow-up and Non-Follow-up steering modes).

Examples of display pictures (see Screen Symbol on page 11):

STANDBY  
mode



Heading to be maintained by rudder



Heading to be maintained by thruster

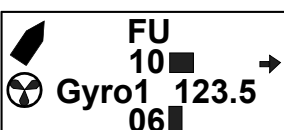


Heading to be maintained by rudder and thruster

Non-follow  
up and  
Follow-up  
steering  
modes

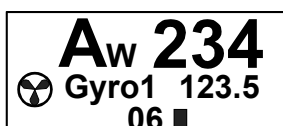


NFU control of rudder and thruster

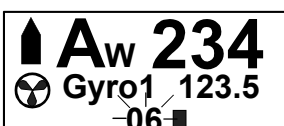


FU control of rudder and thruster

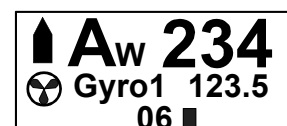
AUTO-  
WORK  
mode



Heading maintained by rudder



Heading maintained by thruster



Heading maintained by rudder and thruster

## Caution

*When operating an On/Off thruster it is important to note that most electrical thrusters have a built in thermal cut-off switch that will shut off the electromotor if it is overheating and re-engage it when it has cooled down. The water temperature also affects the running time. The On/Off thruster may only run for a few minutes, and its total running time for a longer period should be limited by increasing the thruster sensitivity value (refer to the AP50 manual).*

## 2.7 Navigating with the AP51

The AP51 has the capability to use steering information from an external navigator (GPS/Chart plotter or ECS) to direct the boat to one specific waypoint location or through a series of waypoints. In the NAV mode, the AP51 uses the heading sensor as its heading source for course keeping. The steering and speed information received from the external navigator alters the set course to direct the AP51 to the destination waypoint.

## Note !

*Navigational steering must only be used in open waters. By selecting the NAV mode, the AP51 is set for automatic steering on the current set course towards a destination waypoint.*

To obtain satisfactory navigation steering, the following conditions must be fulfilled prior to entering the NAV mode:

- The autosteering must be tested and determined satisfactory
- The navigation receiver must be operating and the navigation system (GPS/Chart plotter or ECS) must be in full operating mode with adequate signal characteristics for valid position and steering data
- At least one waypoint must be entered and selected as the current waypoint in the navigation receiver
- The navigation source in the AP51 User Set-up menu must be set for the navigator that contains the current waypoint

The AP51 is designed to steer in mixed mode operation. This combines the straight steering capability of Cross Track Error (XTE) steering in conjunction with the turning capability of bearing mode steering (course to steer [CTS]).



WP:	SIMRAD
BWW:	100°
Chg.:	← 35°
OK?	Press NAV



Press the NAV button to activate the NAV prompt display.

The display shows the name of the next waypoint (WP), the bearing to the waypoint (BWW), and the required course change (Chg) with the direction in which the vessel will turn.

Press the NAV button to accept the first waypoint as the location

to steer towards. The autopilot turns the vessel onto the new course and the NAV display shows the following information:

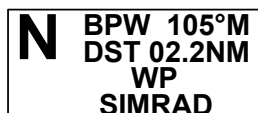


- NAV mode
- Course To Steer (CTS): 340° is set internally in the autopilot to steer the boat along the track. This course is calculated by the autopilot to provide a suitable approach to the track. This is also based upon the Firm or Soft selection of the Initial Navigation setting (see Init NAV under the Settings Menu in the AP50 Manual)
- Compass heading from gyro compass: 299.4°
- Nav source: GPS1
- Cross track error: 0.023 nautical mile to port.

Note !

*For Cross Track Error the number of decimals shown depends on the output from the chart plotter. Three decimals give a more precise steering.*

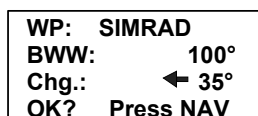
A second short press on the  (NAV-WORK) button alters between the two Nav mode displays.



- Bearing from the current position to the next waypoint (BPW):
- Distance to this waypoint: 2.2 nautical miles
- Next waypoint: Simrad

## Route Navigation

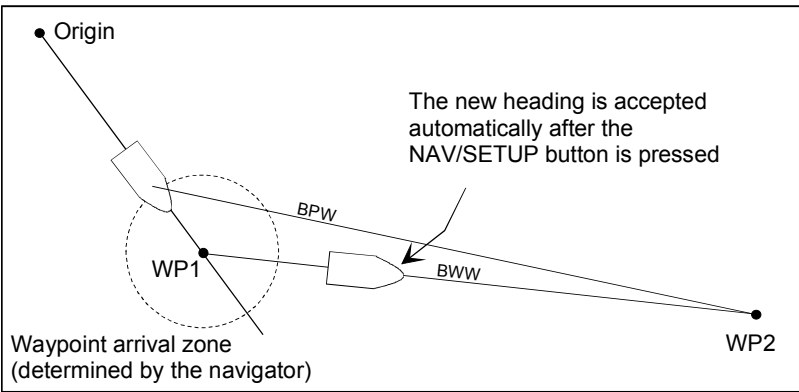
When operating the AP51 in NAV mode to automatically steer through a route of waypoints, the AP51 will steer to the first waypoint in the route after you accept the first waypoint as the location to steer towards.




If you use a GPS/Chart plotter, AP51 will display an alert screen with the proposed new course information, when you arrive at the waypoint. If the required course change is more than 10°, you will need to verify that the upcoming course change is acceptable.

Verification is performed by pressing the NAV-WORK button or turning the course knob after the alert screen is displayed. If an external alarm unit (optional) is connected to the AP50 system, an alarm is given after 5 seconds. If no verification is received, the AP51 will continue on the current set course in NAV mode.





Regain manual steering at any time by pressing the  (STBY) button.

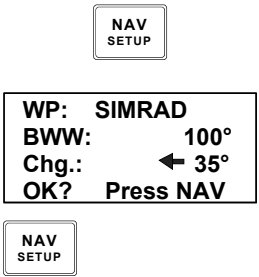
**Note !**

*If the AP50 system is connected to a navigation receiver that does not transmit a message with the bearing to the next waypoint, it will pick a Cross Track Error message and steer on Cross Track Error only. In that case you have to revert to AUTO mode at each waypoint and manually change the set course to equal the bearing to the next waypoint and then select NAV mode again.*

## Electronic Chart System (ECS)

An ECS has to be selected as NAV source.

Press the NAV button to activate the NAV prompt display.



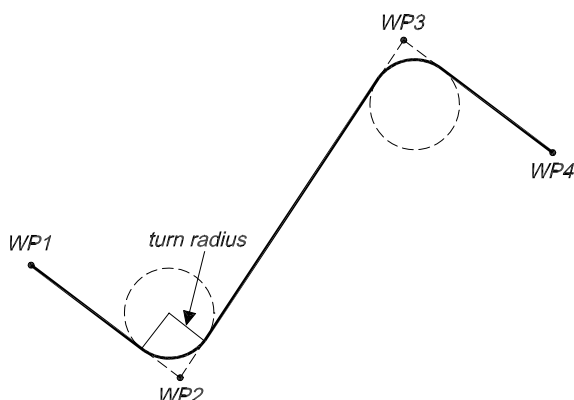
The prompt display shows the name of the next waypoint (WP), the bearing to the waypoint (BWW), and the required course change (Chg) with the direction in which the vessel will turn.

Press NAV to accept the first waypoint as the location to steer towards. The autopilot turns the boat onto the new course while the display flashes “TURNING”.

Accepting the first waypoint as the location to steer towards you also accept the autopilot to automatically steer the boat through the route of waypoints. When the autopilot changes the course at each waypoint, the display flashes “TURNING”.

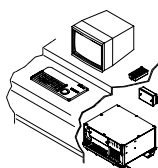
If you wish to confirm the new heading at each waypoint, GPS has to be selected as NAV source.

A route consists of a series of waypoints joined together with straight legs. Each waypoint in a route, except the first and the last, has an associated turn radius defined. This turn radius will allow the ship to turn before the waypoint is reached.



## Caution

*If an ECS is selected as a navigator, the course change verification is waved. This is done so the AP50 is capable of following a route in which the radius of the course change is pre-set in the chart system. Users navigating in this mode must use extra caution.*



## Selecting a Different Navigator

If you have more than one navigation source connected to the AP50 system, you may choose any for navigation. Refer to the User Set-up menu in the AP50 Control Unit Standby mode for details on selecting a different navigator (refer to the AP50 manual).

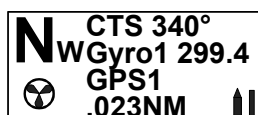
## NAV-WORK Mode

The NAV-WORK-mode is an automatic steering mode to be used under operational conditions different from those normally found when a vessel is in transit on a pre-set course. Examples are trawling, towing, trolling on one engine, slow speed, etc.

In such circumstances, some boats may need a rudder offset when steered manually. By pressing the WORK button directly from NAV mode the rudder offset is maintained and becomes the trim value. A corresponding display is shown:



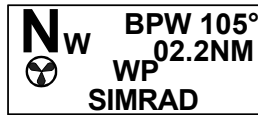
Long press




- NAV-WORK mode
- Course To Steer (CTS): 340° is set internally in the autopilot to steer the boat on to the track. This course is calculated by the autopilot to provide a suitable approach to the track. This is also based upon the Firm or Soft selection of the Initial Navigation setting (see Init NAV under the Settings Menu in the AP50 Manual)
- Compass heading from gyro compass: 299.4°
- Navigation source: GPS1. The boat is located on the port

side of the track.

- Cross track error: 0.023 nautical mile.



A second short press on the  (NAV) button alters between the two Nav-Work mode displays.

- Bearing from current position to next waypoint (BPW): 105° (True)
- Distance to waypoint: 2.2 nautical miles
- Next waypoint: Simrad

If you prefer to have complete manual control of the rudder trim in NAV-Work mode, the autotrim can be permanently disabled in the AP50 Installation Settings menu (refer to the AP50 Instruction Manual).

### Caution


*The Off Heading alarm is permanently disabled in NAV-WORK mode.*




## 2.8 Dodging

### Dodging in AUTO Mode


The AP51 provides the capability for dodging.

Dodging is useful in situations when you need to quickly take control of the helm to steer around an obstruction and then wish to return on the previous set heading after performing the evasive maneuver. A quick press on the  (DODGE/TURN) button activates dodging.



When in DODGE mode, the display will flash showing the set course and DODGE. The set course is remembered by the AP51. When DODGE is flashing on the display, the AP51 is no longer in control of the steering, and you must either steer the boat manually or take control using Non-Follow-Up steering or Follow-Up steering. The current heading will be shown in the display (for example, as 123.5 from Gyro1). In manual steering, the clutch (or bypass valve) in the drive unit will be disengaged when dodging. The AP51 will remain in DODGE mode until you exit DODGE by a second press on the  (DODGE/TURN) button or until you select another mode.

Perform dodging as follows:

1. Press  (DODGE/TURN) button quickly
2. Manually steer the vessel by wheel:



or

Non-Follow-Up:  or  or NFU steering lever.

or

Follow Up: Both   and course knob.

To return from DODGE mode, press one of the following:



Selects AUTO mode with the last set course.




Selects AUTO mode with the current heading as the set course.


**Note !**

*If using Non-Follow-up or Follow-up steering modes while dodging, “NFU” or “FU” flash.*

## Dodging in NAV Mode



A quick press on the  (DODGE/TURN) button activates dodging.

When in DODGE mode the course displayed as Course To Steer (CTS) is the current boat's heading. However, the previous set course is stored by the AP51. When DODGE is flashing on the display, the AP51 is no longer in control of the steering and you must either steer the boat manually or take control using either Non-Follow-Up steering or Follow-Up steering. In manual steering, the clutch (or bypass valve) in the drive unit will be disengaged when dodging. The AP51 will remain in the DODGE mode until you exit DODGE by a second press on the  (DODGE/TURN) button or until you select another mode.



Perform dodging as follows:

1. Press  (DODGE/TURN) button quickly



2. Manually steer the vessel by wheel:



or

Non-Follow-up:  or  or NFU steering lever.

or

Follow Up: Both   and course knob.

To return from DODGE mode, press one of the following:

Returns to NAV mode at the current track.  
(May result in a drastic course change).



Selects AUTO mode with the current heading as the set course.

Selects NAV mode at present position with new bearing to waypoint prompt.

**Note !**

*Using NFU or FU sub modes while dodging will make "NFU" or "FU" flash.*


## 2.9 TURN Mode





### U-turn

The AP51 provides a special U-turn feature when in AUTO or AUTO-WORK modes.

U-Turn changes the current set course 180° in the opposite direction. The user must decide whether the U-Turn should be made to Port or Starboard when bringing the boat on the new course.



A long press (2 seconds) of the  (DODGE/TURN) button activates U-Turn.

The AP51 will continue on the set course until you press either the  (PORT) or  (STBD) button to select the direction in which to make the U-Turn. If you do not press  (PORT) or  (STBD) within 1 minute, the AP51 will return to the AUTO mode and stay on course.

### C-turn

The AP50 also provides a continuous turn feature when in AUTO or AUTO-WORK modes. This may be used for circling fish, purse seining, etc.

C-Turn makes the vessel turn with a constant rate of turn in a circle. The user must decide whether the C-turn should be made to Port or Starboard.

To enter C-turn mode:



First select U-Turn with a long press (2 seconds) of the DODGE/TURN button.



Then, activate C-Turn by another long press (2 seconds) of the DODGE/TURN button

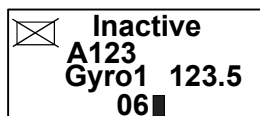


The AP51 will continue on the set course until you press either the PORT or STBD button to select the direction in which to make the C-Turn. If you do not press PORT or STBD within 1 minute, the AP51 will return to AUTO mode and stay on course.

The turn rate can be adjusted either before the turn is initiated or during the turn. Increasing the turn rate yields a smaller circle and vice versa.

*To exit C-turn mode, press any of the mode buttons. When pressing the AUTO button, the new set course is shown in the upper portion of the display.*

## 2.10 Multiple Station System



Inactive control unit

In the normal operation of multiple control units, control is accessible from every control unit and steering handle connected to the AP50 system. However, only one control unit is "active" at a time, providing the user with access to all functions and enabling the user to change modes and to set the course for automatic course keeping. All remaining control units are "inactive" and have no effect on course selection. A single push on either the STBY, AUTO, or NAV buttons on an "inactive" control unit will allow the transfer of command to make it "active". To remain in the mode, press the current mode button.

In Master Operation (Wheelmark) of multiple control units, one control unit must be set up for master operation. "Power on" capability is possible from any unit except from AP51, but "power off" capability is only possible from the master unit (the unit on which Master Operation is set to "yes" in the Installation Dockside menu (refer to the AP50 Manual). In Master operation, the remote control units and handles are normally locked.

## 2.11 Lock function

### Standard Operation

The "LOCK" function is a safety feature included in the AP50 system to lock-out all control units except for a single, user-selected "active" control unit.

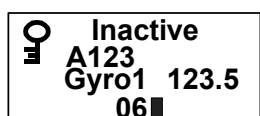
When the "LOCK" function is in use, no transfer of command may take place; only the "active" control unit stays in command.

Note !

*On a locked AP51 Remote Control, backlight and contrast can be directly adjusted through the course knob.*

The "LOCK" function can not be enabled from the AP51 Remote Control.

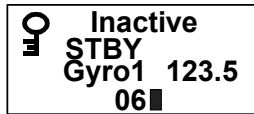
A "locked" AP51 Remote Control will show:



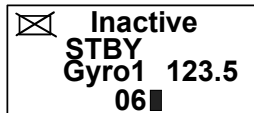
The "LOCK" function is unlocked by double-pressing the STBY button on the "active" AP50 Control Unit.

After having "unlocked" the "active" control unit, it will show this symbol before the display returns to normal. All other control units remain "inactive".

## Master Operation



AP51 locked




AP51 enabled, but inactive




AP51 activated


In Master operation (Wheelmark), all remote units are locked at “power on”. The key icon is shown on all remote units with LED displays.

A quick double press on the master unit’s  (STBY) button enables the remote units. This is indicated on the master unit by a flashing crossed key, while on the remote units, the key icon disappears.

The first remote unit that is activated takes control of the system. If the activated remote unit has a display, all other remote units are locked and units with a display will show the key icon. If the activated remote unit does not have a display (R3000X, FU50, S35, S100, F1/2), all remote units can be operated until a unit with a display is operated. Then, all other remotes are locked.

To unlock the locked remote units, you have to take control from the master unit by quickly double-pressing its  (STBY) button.

## 2.12 User Set-up Menu

In the AP51, the STANDBY, AUTO, and NAV modes have a User Set-up menu with adjustable settings. You can easily reach the set-up menus by a quick double press on the  (NAV) button from the mode you are currently in. Move through the menu items by pressing the Port and Starboard buttons. Use the course knob to change a value.

Compared with the AP50 Control Unit only a limited number of settings are available from the AP51 Remote Control.

### Standby Mode



#### Backlight

The brightness of the backlight of the display and buttons may be adjusted (10 grades, 10 = brightest). The setting is stored when the system is turned off and resets to the stored level when turned on. Adjustment is local to the control unit you adjust.

### Contrast

The contrast of the display may be adjusted (10 grades, 10 = highest contrast). The setting is stored when the system is turned off and resets to the stored level when turned on.

Adjustment is local to the control unit you adjust. At high temperatures, not all steps are available due to automatic temperature compensation.

**Steering func**  
**Thrust+Rudd**

### Steering function



(only available if thruster is selected in the AP50 Control Unit Installation Dockside Menu)



Select between the following steering functions: The boat is steered by the rudder; by the thruster; or by a combination of the rudder and the thruster, dependent on the selected mode.

In AUTO mode and NAV mode only the rudder is used even if thruster or thruster + rudder is selected.

**Course adjust**  
**Language**  
**English**

### Course Adjust

When using the  (PORT) or  (STBD) buttons in AUTO mode, you are changing the set course in 1° increments. If you prefer the increments to be 5 or 10° each press, proceed as follows:



Select *Course adjust* using the  (PORT) or  (STBD). Turn the rotary knob to display the setting. The default value is 1°, which is the preferred setting. Select 5 or 10° if you want to make course changes in 5 or 10° increments with the buttons and fine-tune the set course with the course knob.


### Language

The AP51 can present the display in eight different languages:

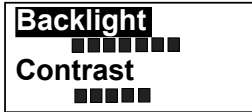
- English, Deutsch, Francais, Espanol, Italiano, Nederlands, Svenska and Norsk.

To access the language selection in the User Set-up Menu:

1. Select Language by using  (PORT) or  (STBD) buttons
2. Turn the course knob to select the language you wish to use.

Leave the User Set-up Menu by a press on the  (STBY) button.

## Auto Mode



### Backlight

Same procedure as in STANDBY mode.

### Contrast

Same procedure as in STANDBY mode.

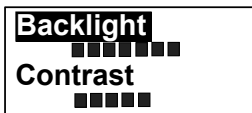
### Steering function

Same procedure as in STANDBY mode.

## Auto-Work Mode



To enter the User Set-up menu when in AUTO-WORK mode, quickly double press the NAV button.



### Backlight

Same procedure as in STANDBY mode.

### Contrast

Same procedure as in STANDBY mode.

These values are stored in the AP50 memory and are automatically recalled when returning to AUTO-WORK mode.



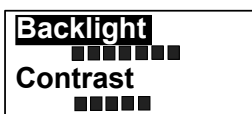
### Steering function

Same procedure as in STANDBY mode.

### Trim

Use the course knob to adjust the rudder trim value if needed. The (manual) trim compensates for the Autotrim, which needs time to build up the appropriate rudder off-set. The Trim setting is not stored.

## Nav Mode



The Nav mode will not work satisfactory before Auto mode is set up and working properly.

### Backlight

Same procedure as in STANDBY mode.

### Contrast

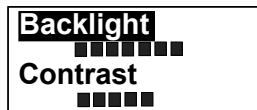
Same procedure as in STANDBY mode.



### Steering function

Same procedure as in STANDBY mode.

## Nav-Work Mode



To enter the User Set-up menu when in NAV-WORK mode, quickly double press the NAV-button.

### Backlight

Same procedure as in STANDBY mode.

### Contrast

Same procedure as in STANDBY mode.

### Steering function

Same procedure as in STANDBY mode.

These values are stored in the AP50 memory and are automatically recalled when returning to NAV-WORK mode.



### Trim

Use the course knob to adjust the rudder trim value if needed. The (manual) trim compensates for the Autotrim, which needs time to build up the appropriate rudder off-set. The TRIM setting is not stored.

### Note !

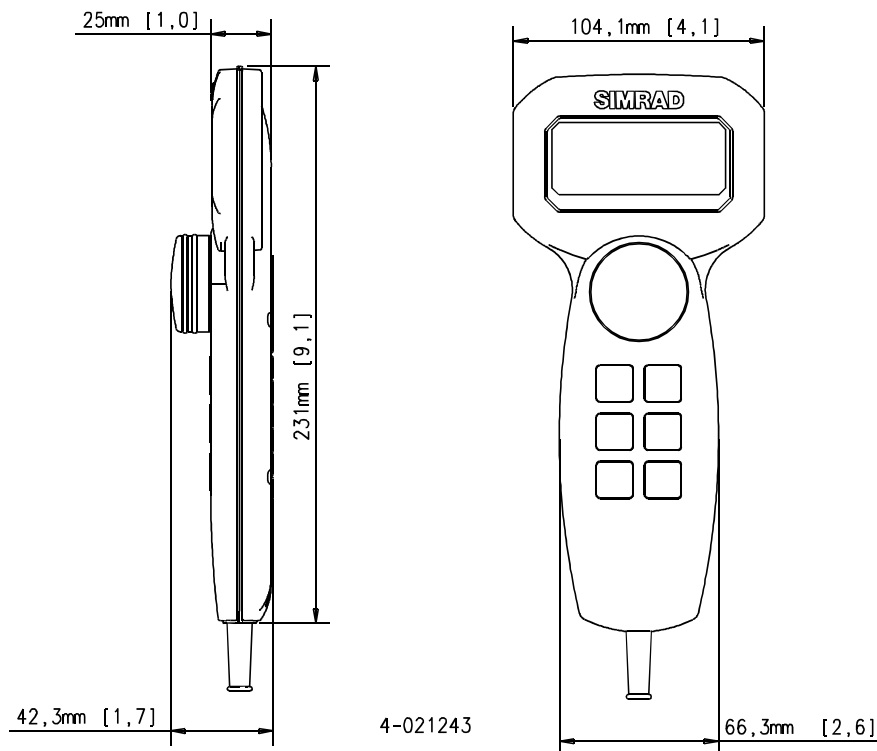
*On a locked AP51 Remote Control, backlight and contrast can be directly adjusted through the course knob.*



## 3 TECHNICAL SPECIFICATIONS

### 3.1 AP51 Remote Control

Dimensions: ..... See Figure 3-1  
 Weight: ..... 0.57 kg (1.25 lbs.)  
 Material: ..... PC-ABS  
 Supply ..... 12-32 VDC  $-10\%+30\%$  via RobNet  
 Power consumption ..... 3 W  
 Environmental Protection: ..... IP56  
 Safe distance to compass: ..... 0.35 m (1.0 ft.)  
 Color: ..... Black  
 Temperature:  
     Operating: .....  $-25$  to  $+55^{\circ}\text{C}$  ( $-13$  to  $+130^{\circ}\text{F}$ )  
     Storage: .....  $-30$  to  $+80^{\circ}\text{C}$  ( $-22$  to  $+176^{\circ}\text{F}$ )  
 Display:  
     Type: ..... Backlit LCD matrix  
     Resolution: ..... 80 x 32 pixels  
 Illumination: ..... Adjustable in 10 grades  
 Mounting: ..... Handheld or placed in a fixed, bracket-mount  
 Cable: ..... 7m (23 ft.) RobNet cable with air tube and one male connector



**Figure 3-1 AP51 Remote Control Dimensions**

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## **4 INSTALLATION**

### **4.1 General**

This section provides detailed information required to properly install AP51 Remote Control. To install a complete AP50 Autopilot system, refer to the AP50 Instruction Manual.

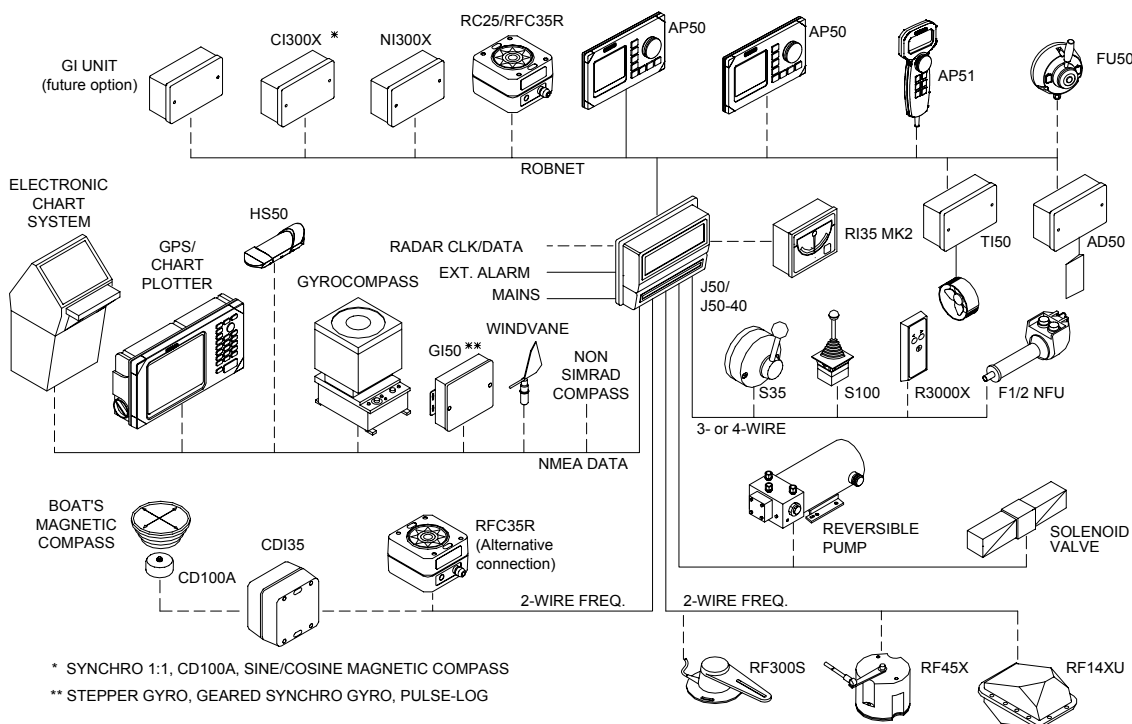
### **4.2 Unpacking and Handling**

Care should be taken when unpacking and handling the equipment. A visual inspection should be made to ensure that the equipment has not been damaged during shipment and that all parts are present according to the packing list.

### **4.3 Determine system configuration**

As many of the units are communicating on a common network (RobNet), with identical connectors, the installation is simplified. Mount the units within the standard cable length supplied with each unit, if possible (refer to Technical Specifications, page 31). RobNet Extension Cable (10m) is available from your Simrad distributor. Refer to the Spare Parts List on page 41 for part numbers.

## 4.4 AP50 System Layout



**Figure 4-1 AP50 Extended system with options**

**Note !**

*The extended system layout does not show all possibilities.*

### RobNet network cables

As most RobNet units have 2 RobNet connectors, they can be used for further expansion of the system. There are no dedicated "in" or "out" connectors. You may connect the cables to any available RobNet connector on the specific unit.

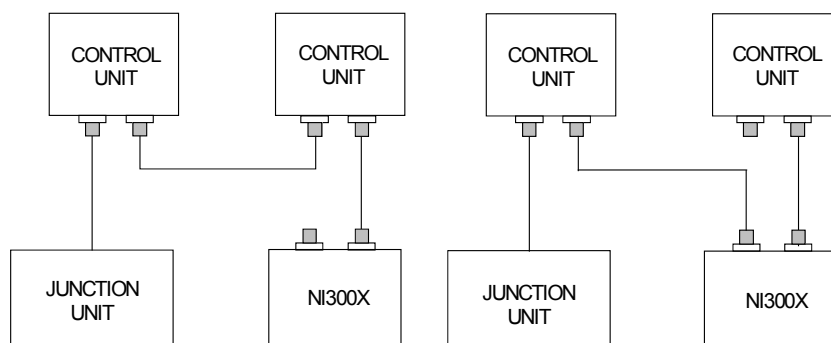
The RobNet cables are available in 7 and 15 m lengths and they contain a 6 pin male connector at one or both ends. The 15 m cable to the junction unit has connector only at the control unit end.

Additional extension cable (10 m) with a male and a female connector is available from Simrad (part no. 20192266).

When installing a system, try to minimize the total RobNet cable length by connecting all RobNet units to the nearest available RobNet connector.

For total length of RobNet cable refer to table in the AP50 manual.

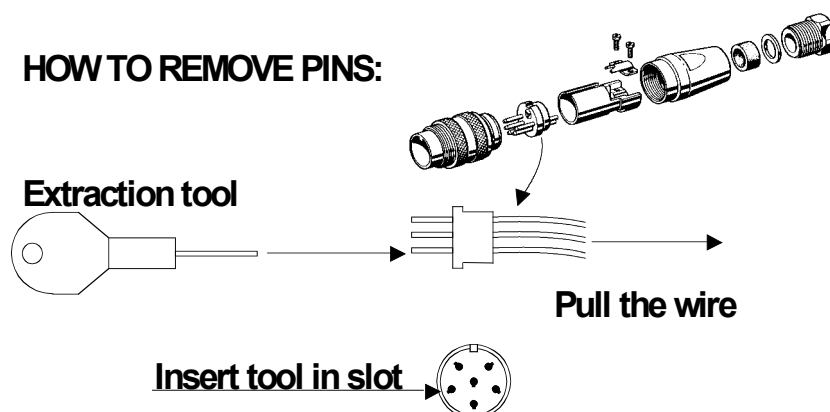
Examples of interconnecting RobNet units:



**Figure 4-2 Interconnecting RobNet units**

All connectors are crimp-type and can be easily disassembled if desired for ease of installation (see Figure 4-3).

### HOW TO REMOVE PINS:



**Figure 4-3 Removing Pin**

See Table 4-1 for pin configuration and color code of the network cable. **DO NOT MIX THE PINS AND THE CABLE COLORS!**

### Note !

*Apply a thin layer of pure Vaseline (petroleum jelly) on the connector threads and make sure the connectors are properly secured to the receptacle by the coupling ring. When properly installed, the connectors are weatherproof according to IP56. All unused RobNet plugs must be fitted with plastic caps to keep the connectors free of dirt and moisture. A separate screw cap for the control unit is included in the installation kit.*

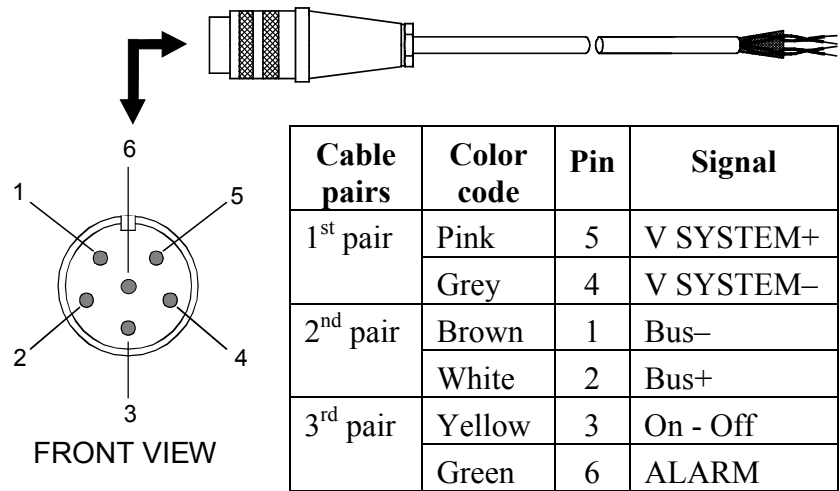


Table 4-1 RobNet Plug Pin Configuration

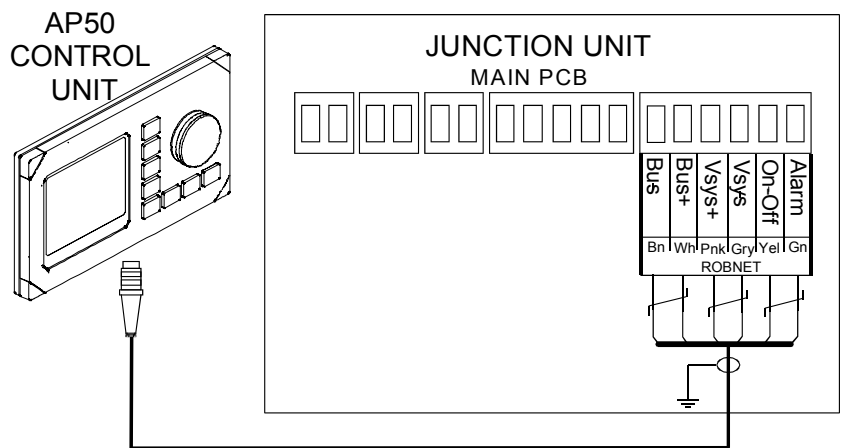


Figure 4-4 Control unit connection

**Note !** *For installations that require special cable length, contact your Simrad distributor for information.*

**AP51 Remote Control Connection**

To connect the AP51 Remote Control to the system, use the RobNet connector in a free receptacle (see Figure 4-2). Alternatively cut the connector from the cable and connect the wires in parallel with the cable shown on Figure 4-4 using the same color code.

**Note !** *The AP51 cable contains a ventilation tube. Check that the tube is open after you have cut the cable.*

**Note !****AP51 in a Wheelmark System**

In a Wheelmark system, only the Master Unit may turn the system off. To ensure that the system cannot be switched on or off from the AP51 Remote Control Unit, the yellow wire in the AP51 cable must be cut or not connected. Open the RobNet connector (see Figure 4-3). Remove pin 3 (yellow wire) and cut it off at the end of the wire. Insulate the wire and push it back in the pin 3 slot. Reassemble the RobNet connector.

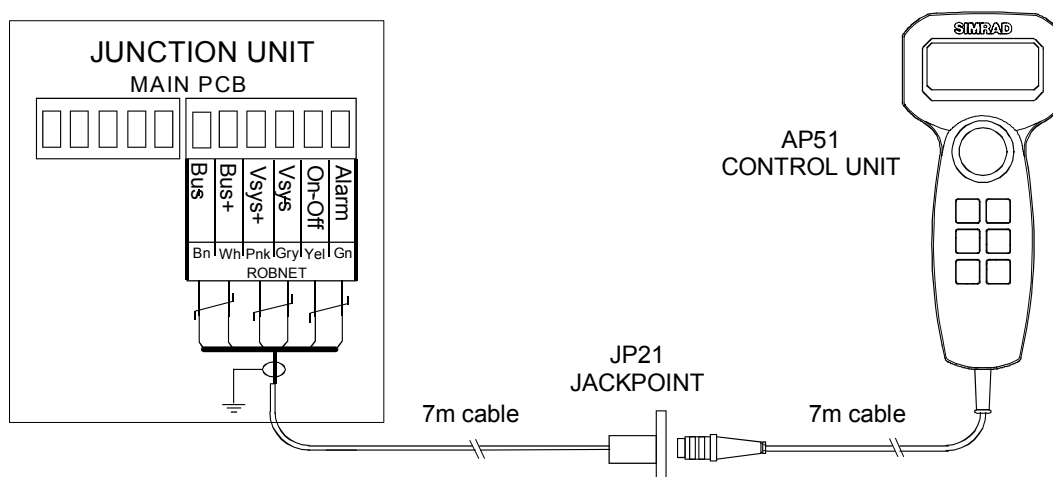
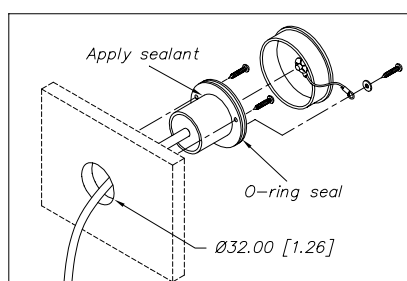
*This must be done to enable a valid installation according to the Marine Directive (Wheelmark).*

**JP21 Jack Point Installation**

The JP21 Jack Point can be used in conjunction with the AP51 Remote Control.

It provides a quick and simple means of connection and disconnection of the AP51 at different locations on the boat.

The JP21 includes a watertight connector cover that must be installed as shown below. A 32 mm (1.26 inch diameter) hole must be drilled for flush installation, along with 3 small screw holes. As indicated, a watertight sealant must be applied to the mating surfaces of the JP21 and the mounting panel. Apply a thin layer of Vaseline to the O-ring seal.



**Figure 4-5 JP21 Jack Point Mounting**

## **5 SOFTWARE SET-UP PROCEDURE**

The installation settings have to be performed from the AP50 Control Unit.

For installation settings, final test and user training refer to the AP50 Instruction Manual.

For user setting, see User Set-up Menu, page 27



## 6 MAINTENANCE

### 6.1 AP51 Remote Control

Under normal use, the AP51 Remote Control will require little maintenance.

If the unit requires any form of cleaning, use fresh water and a mild soap solution (not a detergent). It is important to avoid using chemical cleaners and hydrocarbons such as diesel, petrol, etc.

Make sure that all open RobNet connectors are fitted with a protection cap.

It is advisable at the start of each season to check the RobNet connectors and cover with Vaseline or WD40.

### 6.2 Exchange of software program

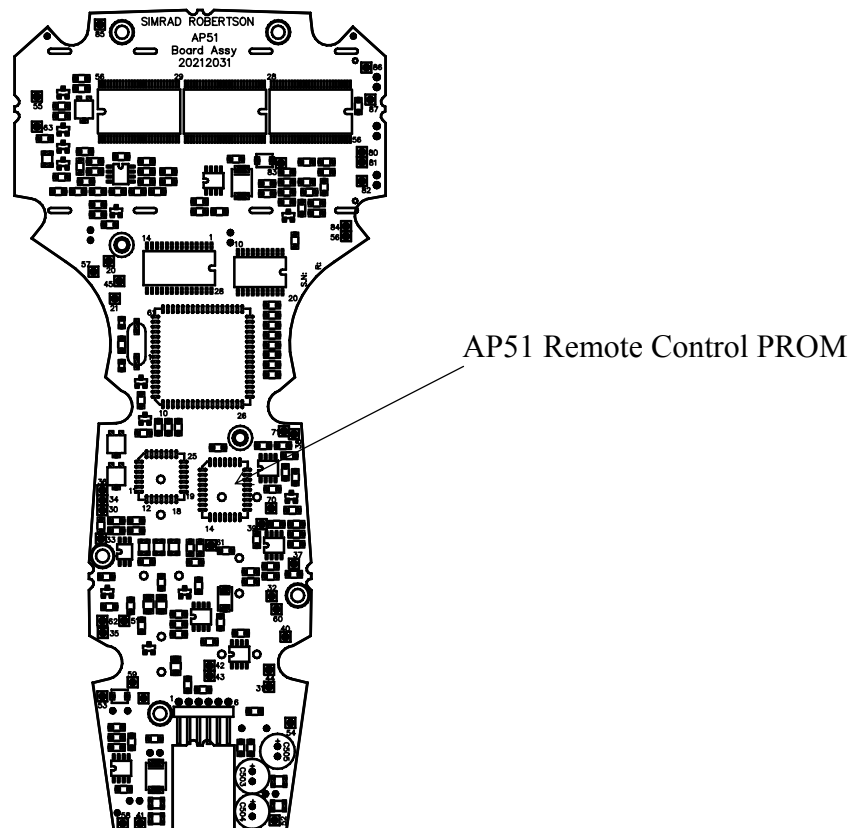
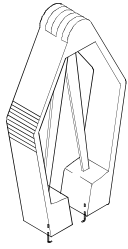
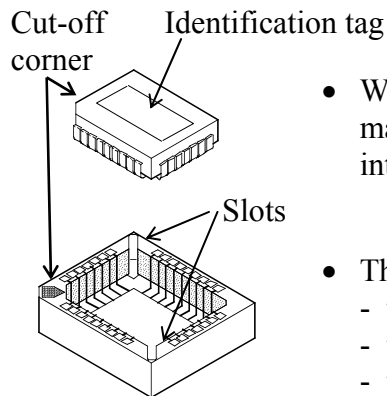


Figure 6-1 AP51 PCB, component layout



PROM extraction  
tool

- Remove the Programmable Read-Only Memory (PROM) from the socket with the PROM extraction tool (part number 44139806).
- Insert the tool by pressing the two grip pins down into the two slots in the corners of the socket.
- Squeeze the tool and pull out the PROM.



- When inserting new PROMS, make sure its cut-off corner matches with the corner in the socket. Press the PROM gently into the socket.
- The identification tag on the PROM indicates:
  - the name of the unit
  - the Simrad part number
  - the software version

## Caution

***Make sure that the correct PROM is mounted in each unit.***

PROM for AP51 Remote Control: P/N 20212007

## 7 TROUBLESHOOTING

An autopilot is a complex system. Its performance depends on a proper installation and a successful sea trial.

In the event of an autopilot failure, the AP50's numerous test features that will assist you in isolating a probable fault.

Audible and visual alarm is provided for every fault being detected.

The audible alarm is reset by pressing any button (e.g. by changing mode from AUTO to STANDBY). All visual alarms will remain and alternate with the operating display until the fault has been rectified. If an external alarm buzzer is installed (refer to the AP50 Manual). If an external alarm will be given 5 sec. after the internal. Refer to the table below for hints to try to solve the problem yourself. You may also consult your nearest Simrad dealer for assistance, if required.

Perform any repair actions in the listed sequence.

Note !

*'Compass difference', 'Vessel off course', and 'Rudder limit' warnings are automatically reset when the error is rectified.*

### 7.1 Warnings

Display readout	Probable fault	Recommended action
<div> Simrad J300X SW V1R1 P00 M00 S000 </div>	If the J300X/J3000X status display is shown at switch on, the start-up sequence will stop to indicate that an invalid junction unit is installed	Install the J50 Junction Unit.
<b>System failure alarms:</b>		
Rudder feedback failure (autopilot operates on simulated feedback and the simulated feedback angle is shown in the display)	Rudder feedback signal is missing or erratic. Analog rudder not installed.	<ol style="list-style-type: none"> <li>1. Check all connections.</li> <li>2. Check the alignment as per the installation instructions.</li> <li>3. Replace rudder feedback unit.</li> <li>4. Install analog rudder.</li> </ol>
Flashing rudder angle indicator	Rudder not selected under the Steering function.	Select Rudder under Steering function in the User Set-up menu.

Display readout	Probable fault	Recommended action
No rudder response (Remains in actual mode without any rudder command)	<ul style="list-style-type: none"> <li>– Steering gear not operative</li> <li>– Broken connection</li> <li>– Missing power</li> <li>– Defective electronics</li> </ul>	<ol style="list-style-type: none"> <li>1. Check all connections.</li> <li>2. Check Rudder FB transmission link, steering gear, and change over switches.</li> <li>3. Check the drive unit motor/brushes and bypass valve/clutch.</li> </ol> <p>For solenoid drive:</p> <ol style="list-style-type: none"> <li>4. Check LEDs for command from galvanic isolated solenoid electronics (refer to the AP50 Instruction Manual).</li> <li>5. Replace the junction unit Power PCB.</li> <li>6. Check the jumper switch (S1) setting on J50 Power PCB.</li> </ol> <p>For Analog or Proportional drive:</p> <ol style="list-style-type: none"> <li>7. Check that the AD50 is operative (ref. separate manual for AD50).</li> </ol>
Rudder too slow	Excessive load on steering gear, air in the hydraulic system or insufficient drive unit capacity.	<ol style="list-style-type: none"> <li>1. Look for mechanical obstructions at the rudder/tiller/quadrant. Check the back drive force.</li> <li>2. Bleed the hydraulic system.</li> <li>3. Replace with a bigger pump unit.</li> </ol>
Rudder test failed	The following conditions may exist: a) Rudder feedback failure. b) J50 current overload. c) Bypass/clutch overload.	Refer to the recommended actions for the specific probable faults.
	Rudder moves in only one direction a) Poor connection to one of the solenoids (continuously running pump). b) Faulty Power PCB in junction unit.	<ol style="list-style-type: none"> <li>a) Check the connections</li> <li>b) Replace the junction unit Power PCB</li> </ol>

<b>Display readout</b>	<b>Probable fault</b>	<b>Recommended action</b>
Rudder test failed	Rudder test not completed within 2 min. a) Poor connections to the drive unit. b) Faulty Main PCB in the junction unit. c) Faulty Power PCB in junction unit.	a) Check the connections. b) Replace the Main PCB c) Check the Power PCB for traces of burned transistors. – Change Power PCB.
	Rudder moves at full speed to one side. a) Faulty Power PCB in junction unit.	Replace the junction unit Power PCB
Steering compass missing  Monitor compass missing	No data from the selected compass.	1. If more than one compass is connected to the system, refer to the User Set-up menu to select a different compass. 2. Check the connections and the Interface menu for proper set-up. 3. Service appropriate compass.
Failure active Control Unit	Active control unit goes silent.	1. Press the STBY button on an "Inactive" unit to reset. 2. Check/repair the RobNet cable. 3. Replace the control unit PCB.
J50 current overload (Remains in actual mode without any rudder command)	The drive unit shut down due to an excessive load or a short circuit.	1. Check the drive unit and drive unit installation. 2. Disconnect the drive unit. If the fault is still present, replace the junction unit Power PCB.
J50 Internal Voltage	Internal 15 V supply in junction unit is below the limit.	1. Replace the junction unit Main PCB. 2. Replace the junction unit Power PCB if Mains voltage is 12V.
J50 high temp.	Excessive temperature in the junction unit (>75°C), possible long term overload.	1. Switch off the autopilot. 2. Check for backload in the drive unit/steering system. 3. Check that the junction unit specifications match those of the drive unit.

Display readout	Probable fault	Recommended action
Memory failure J50	Wrong checksum on memory parameters or variables.	Perform a "Master reset" and make a new "Dockside set-up". Switch off and on again. If the alarm is repeated, replace Junction unit Main PCB.
Com. failure with J50	Faulty junction unit or poor RobNet cable connections from the junction unit.	<ol style="list-style-type: none"> <li>1. Check the RobNet connectors and cable.</li> <li>2. Replace the junction unit Main PCB.</li> </ol>
Low supply voltage	Mains voltage less than 9 V.	<ol style="list-style-type: none"> <li>1. Verify in the System Data menu</li> <li>2. Switch autopilot off and charge batteries.</li> <li>3. Check/repair battery charger.</li> </ol>
High supply voltage	J50, J50-40 Mains exceeds 44 V.	<ol style="list-style-type: none"> <li>1. Verify in the System Data menu</li> <li>2. Switch the autopilot off.</li> <li>3. Check/repair battery charger.</li> </ol>
Compass difference	The difference in readings between the main compass and the monitor compass exceeds the limit set for "Compass difference".	Check the operation of both compasses (see 'System Data' in the AP50 Manual. If one compass is magnetic, the error may be caused by deviation change or heavy sea disturbances. (See AP50 Manual)
Speed missing (Automatic reset when available, see page 27)	The speed signal from the GPS or the log is missing (15 sec. delay).	Check the GPS, log, and cable connections.
Rudder limit	The set rudder limit has been reached or exceeded.	This is a warning only and may be caused by disturbance to compass (waves), speed log, sharp turn or improper parameter setting.
No thruster valve voltage	There is no voltage from the Danfoss valve to TI50.	Check that the Danfoss thruster is switched on. Check the cable connections.

Display readout	Probable fault	Recommended action
No thruster response	<ol style="list-style-type: none"> <li>1. Speed too high for thruster operation</li> <li>2. J50 has lost communication with the TI50 Thruster Interface.</li> <li>3. Broken connection or defective electronics.</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to set limit for Thruster Inhibit. Refer to the AP50 Instruction Manual.</li> <li>2. Check cabling or operation of the TI50 Thruster Interface. Refer to separate TI50 Manual.</li> <li>3. Try to switch system off and on</li> <li>4. Check thruster installation.</li> <li>5. Replace unit.</li> </ol>
Vessel off course	Extreme weather conditions, very slow speed, or boat's heading is outside the fixed Off heading limit of 20° (automatic reset when inside the limit).	<ol style="list-style-type: none"> <li>1. Check the steering parameters (Rudder, Autotrim, Seastate filter).</li> <li>2. Increase the Rudder value</li> <li>3. Increase the boat speed, if possible, or steer manually.</li> <li>4. Check the steering gear and autopilot interface.</li> </ol>
NAV. data failure (- - -)	Missing or invalid Nav. data.	<ol style="list-style-type: none"> <li>1. Use the NMEA Test menu in the AP50 Control Unit.</li> <li>2. Check the Nav. receiver set-up.</li> </ol>

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## 8 SPARE PARTS LIST

### AP51 Remote Control

20211975	AP51 Remote Control
22086276	Mounting Kit
20212015	AP51 Front Housing Ass'y
22086193	Back Cover
22086383	Cable With Gasket
20212031	AP51 Board Ass'y
20212007	AP51 PROM (programmed) V..R..

### RobNet cables and connectors

22081145	RobNet Cable 15 m (49") with one Male Connector
20191607	RobNet Cable 7m (23') with Male Connectors
20191615	RobNet Cable 15m (49') with Male Connectors
20192266	RobNet Extension Cable 10m (33') with Male and Female Connector
44138048	RobNet Cable (bulk)
44160844	Male Connector - Crimp Type
44160851	Female Connector - Crimp Type (for extension cable only)

### Tools

44139707	Key for Lock Ring on RobNet Receptacles
44139806	PROM Extraction Tool
44161792	RobNet Pin Extraction Tool (for crimp type connectors)

### JP21 Jack Point

22086433	J21 Jack Point
22886441	Connector Cover

## 9 GLOSSARY

**Apparent wind** – see relative wind

**Arrival alarm** – An alarm signal issued by a voyage-tracking unit that indicates arrival at or at a predetermined distance from a waypoint. (see arrival circle).

**Arrival circle** – An artificial boundary placed around the destination waypoint of the present navigation leg, the entering of which will signal an arrival alarm.

**Arrival perpendicular** – Crossing of the line which is perpendicular to the course line and which passes through the destination waypoint.

**Bearing** – The horizontal direction of one terrestrial point from another, expressed as the angular distance from a reference direction, usually measured from 000° at the reference direction clockwise through 359°.

**BPW – Bearing position to waypoint** – Bearing to a specified waypoint from present position.

**BWW – Bearing waypoint to waypoint** - Bearing angle of the line between the “TO” and the “FROM” waypoint, calculated at the “FROM” waypoint for any two arbitrary waypoints.

**COG - Course Over Ground** - The actual direction of progress of a vessel with respect to the surface of the earth. The vessels heading may differ from the course over ground due to the effects of wind, tide, currents.

**ECS – Electronic Chart System**

For advanced navigation steering with preset radius in routes of waypoints.

**ECDIS – Electronic Chart Display Information System.**

Type approved ECS system according to the ECDIS regulations.

**GPS - Global Positioning System** - This system consists of 18 satellites plus 3 spares in fixed orbits, circling the earth at an altitude of approximately 20,200 km. The system will provide the user with 24 hour a day all weather position coverage, with an accuracy of 15 to 100 meters.

**Great circle route** – A course that is the shortest distance between two points, following a great circle

**Heading** – The horizontal direction in which a ship actually points or heads at any instant, expressed in angular units from a reference direction, usually from 000° at the reference direction clockwise through 359°.

**IMO MSC(64)67** – (International Maritime Organization) Performance standards for heading control system.

**ISO 11674:2000(E)** – (International Organization for Standardization) Specifies the structure, performance, inspection and testing of heading control systems.

**Loran C** - A complex radio navigation network developed by the US coast guard, to assist a navigator in determining his precise location. The acronym, Loran C, stands for Long Range Navigation. It is an all weather 24 hour a day electronic system of shore based radio transmitters.

**Magnetic bearing** – Bearing relative to magnetic north; compass bearing corrected for deviation.

**Magnetic deviation** – Compass error; the difference between the reading of a compass and the actual magnetic course or bearing due to errors in the compass reading.

**Magnetic heading** – heading relative to magnetic north.

**Magnetic variation** - A magnetic compass points to the magnetic north pole. The difference between this direction and true north is the magnetic variation. The amount and direction of this variation is dependent upon where on the earth you are located.

**NMEA 0183** - A format (language) designed to permit communication between various types of marine electronic equipment. In essence, this is a two-wire shielded, serial data link, permitting one device to talk while other devices listen. Numerous different sentences are available, permitting communication between various different devices.

**Relative wind** – The speed and relative direction from which the wind appears to blow with reference to a moving point (also called apparent wind).

**Rhumb line** – A line that passes through all meridians at the same angle. When drawn on a Mercator chart, the rhumb line is a straight line. However, the Mercator chart is a distortion of a round globe on a flat surface, so the rhumb line will be a longer course than a great circle route.

**Route** - A stored sequence of waypoints. These waypoints will be listed in the order in which you desire to follow them.

**SOG** - Speed over ground is the actual speed of the vessel relative to the ocean floor.

**True bearing** – Bearing relative to true north; compass bearing corrected for compass error.

**True heading** – Heading relative to true north.

**VDR** – Voyage Data Recorder. Recording and storing all information that can be relevant for reconstructing accidents, such as time, date, position, speed, heading, depth, video, communication, etc. Performance requirements are specified in the IMO A.861(20), the EU directive 1999/35/EC and IEC61996.

**Waypoint** - A discrete point, stored in a navigator, located on the surface of the earth. Normally this point will be identified by Lat/Lon coordinates although in some systems it may be shown by T.D.'s.

**XTE - Cross Track Error** - Used to identify a vessels position relative to a straight line drawn between two waypoints. The amount the vessel is off to the left or to the right of this line is known as the track.

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