



Helmsman RTC20S Operation and Installation



Helmsman RTC20S for Simrad & Robertson Autopilots



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Scope

This manual serves as a reference guide for installing and operating the Helmsman RTC20S follow-up steering control. Please take time to read this manual to become familiar with proper installation of the Helmsman and to understand how it is used with previous generation Simrad autopilots.

Overview

The Helmsman RTC20S is a “full-follow-up” steering control designed for use on marine vessels equipped with the popular “Simrad Robnet” based automatic pilots. The Helmsman RTC20S is not intended for use with Simrad products except those using a Robnet communications network. Compatible autopilot models are listed in the following installation section.

The Helmsman RTC20S uses the Simrad FU50 circuit subassembly, so its operation is identical to that of the Simrad FU50 with only a few minor differences and several improvements. Like the FU50, the operator can select STANDBY, TILLER, and AUTO modes of operation with just two pushbuttons. The pushbuttons are stainless steel, piezoelectric switches that will not leak or gum-up. Activation of each mode is confirmed by waterproof LED indicators.

The Helmsman unit is constructed entirely from rugged, noncorrosive materials. The housing is submersible and pressure balanced to eliminate vacuum formation (as ambient temperatures change) making it ideal for deck or flybridge locations.

The rotary steering lever includes a midship detent to improve tactile feedback to the operator. As with the Simrad FU50, the handle can be positioned up, or down, and the action of the handle can also be reversed in order to provide customized, and more intuitive, command over the vessel’s rudders position.



Operation

Power up

When power is first applied to the autopilot system the RTC20S, and any other steering control on the Robnet network, will “wake up” in STANDBY mode with its STANDBY indicator blinking slowly. The Helmsman RTC20S can wake the system from sleep mode by pressing the STANDBY button, but cannot place the system back in sleep mode, this must be done from the control unit.

Tiller mode

Pressing the STANDBY/TILLER button, after the system is powered up, takes command of the autopilot and activates TILLER mode. The STANDBY indicator will extinguish and the TILLER indicator will illuminate. The lever can now command the rudder position. Pressing the STANDBY/TILLER button again will cause the control to revert back to STANDBY mode.

[Caution: Always observe the position of the steering lever prior to selecting the TILLER mode as the rudder will immediately respond by moving to that position!]

Autopilot mode

Pressing the AUTO button immediately captures the current vessel heading and engages autopilot steering mode in order to maintain that heading. The previous mode indication will extinguish and the AUTO indicator will illuminate.

Navigation mode

NAV mode cannot be selected from the Helmsman RTC20S steering lever.



Course changes

While operating in AUTO mode, course changes can be made as follows: Select TILLER mode and steer the vessel onto the desired course. When the course is stable, press the AUTO button again. The vessel will maintain that new heading.

[Note: If the vessels rudder position is not centered when AUTO mode is engaged, the rudder will automatically return to the center position as the vessel acquires the new heading.]

Multiple steering controls

When operating a Simrad autopilot system having multiple RTC20S (or FU50) steering levers, vessel control can be accessed from any steering station connected to the system. Unless the autopilot main control-unit is in master lockout mode (refer to your Simrad operator manual) a single press on any of the mode buttons will permit the operator to assume command from that station. Only one station will be in control at one time while all other units will remain in STANDBY mode.

Manual helm

When *all* steering controls (including the main control unit) are in STANDBY mode the vessel can be steered manually from the helm.

Alarms

Alarm conditions are indicated by rapid flashing of the LED mode indicators. Alarm messages can only be read and reset from the main control unit. If an alarm condition does occur, carefully note the alarm message before resetting the system. If a “Communication failure with JXX or ACXX” is displayed on a control unit, it signals an erratic or no Robnet (bus) input to the unit. To reset the alarm simply return the system to STANDBY mode or turn the power off and back on.



Refer to the autopilot manual troubleshooting table for specific alarm information.

Installation

Autopilot compatibility

The RTC20S can be connected to any Simrad autopilot system that is compatible with the manufacturers discontinued FU50 steering control. Popular autopilots such as the Simrad AP35 and AP50 are typical. These systems use the J3000X, J300X, J300X-40, J50, and J50-40 junction units.

Software compatibility

Software in the J300X and J3000X junction units should be version V1R6 or higher. Simrad's J50 and J50-40 junction units were introduced after the J3xx series and are therefore compatible. Your autopilot software version will be momentarily displayed on the main control unit during the power-up, self-test period. The software version can also be viewed in the autopilot setup menu. Please refer to your specific autopilot operation manual on how to identify the installed software.

Mounting the enclosure

A mounting template is included with this manual. Mounting fasteners are supplied with the unit. The fasteners are 1 ½" length, ¼-20 thread, stainless steel hex bolts. The 4 hex bolts can be inserted into recesses in the housing after the cover assembly has been removed.

[Note: When the cover assembly is removed from the enclosure, sensitive electronic circuitry will be exposed and therefore vulnerable to damage from outside elements. Be sure to keep the exposed circuit board dry and protected while mounting the enclosure base!]



Mounting location

Before mounting the enclosure, one should decide if the lever will be installed pointing up or pointing down. This depends on the operator's preference. Also make sure that there are adequate clearances when the lever is moved to the hard-over position. A short ball handle is available as an alternative to the standard lever.

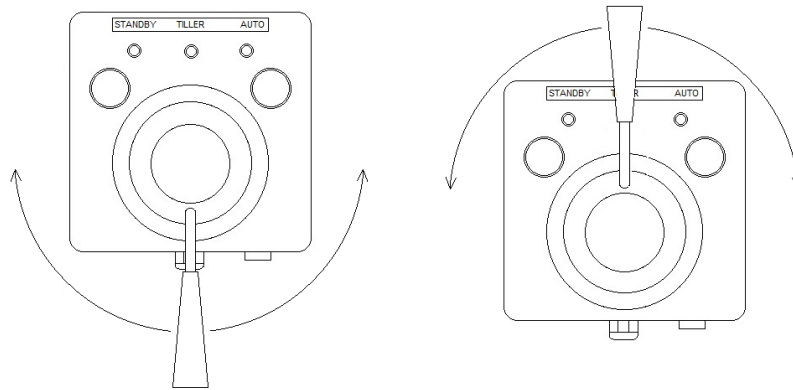


Figure 1

The handle can be installed pointing up or down. The port or starboard action can also be reversed depending on user preference.



The Helmsman RTC20C, for Comnav automatic pilots, is shown here in a typical installation. This is the side station on a commercial Dungeness crab-fishing vessel. Mounting the Helmsman



close by the clutch and throttle controls improves vessel handling and greatly increases efficiency when setting and retrieving gear.

Cable connections in the Helmsman RTC20S

A typical installation of the Helmsman RTC20S makes use of existing Simrad cabling. This cable consists of three twisted pair #24 conductors with an overall braided shield. The three “balanced pairs” have impedance characteristics optimized for RS485 multidrop applications. If an existing Simrad cable is to be used, be sure to inspect it for signs of leakage and corrosion. A puncture in the outer jacket will usually show as deterioration of the braided shielding. Water can travel along the braided shield and cause damage to expensive electronics, so careful inspection is indicated.

Pair	Color	Function
1	Brown White	Data bus – Data bus +
2	Pink Gray	System voltage + System voltage –
3	Yellow Green	On / Off control Alarm

Figure 2

Individual conductors are color-coded to simplify interconnection and to reduce the possibility of wiring error. The conductor pairs are listed here according to function.

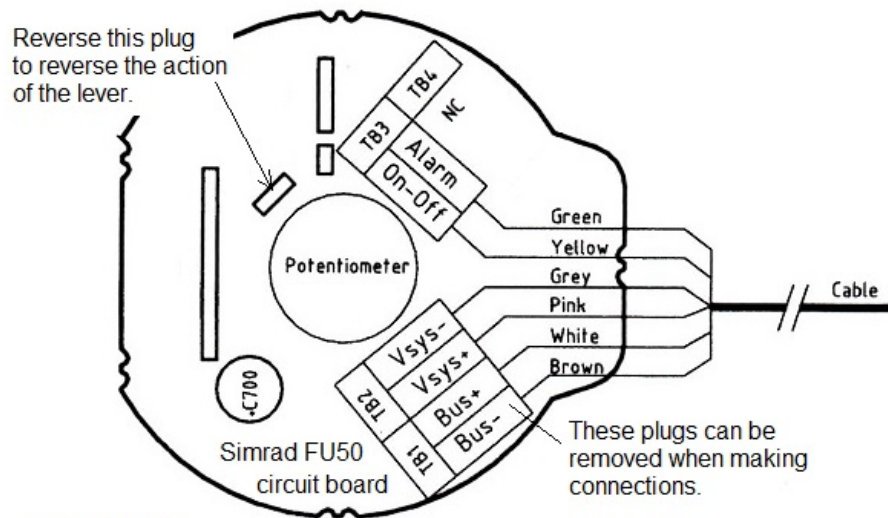


Figure 3 Helmsman RTC20S connections

To connect the Simrad cable to the Helmsman, loosen the compression cap on the cord-grip enough to freely pass the cable through the compression seal, allowing enough slack to work with. Remove approximately 5 inches of the outer jacket and braided shield, making sure that there are no exposed strands. The braided shield is not attached on this end. Remove 3/8-inch insulation from each wire and attach each as shown in the preceding diagram. Pull back excess slack and secure the cord grip.

[Note: When making these connections, the small, blue, terminal blocks (TB1, TB2, TB3) can be removed from the circuit board in order to make things easier. Lift them straight up.]

Cord grip

The metallic cord grip is a liquid tight version rated IP68 and submersible to a depth of 300 feet when properly assembled. The grip will accommodate cables having an outside diameter between 0.16" to 0.30" (4 to 8 mm). The compression cap must be secured to provide sealing and strain relief. This should be tightened securely. When tightened properly one should see the inner seal extruding slightly



and the cable should be free from slippage. Install the cover after close inspection of the perimeter gasket.

Cable connections at the junction unit

If the cable is not already attached at the junction-unit end then refer to the following diagram and to the Simrad autopilot installation manual.

[Note: Simrad autopilots maintain a constant standby voltage even when the control unit appears to be off. Remove power from the autopilot system prior to making any connections in the junction unit!]

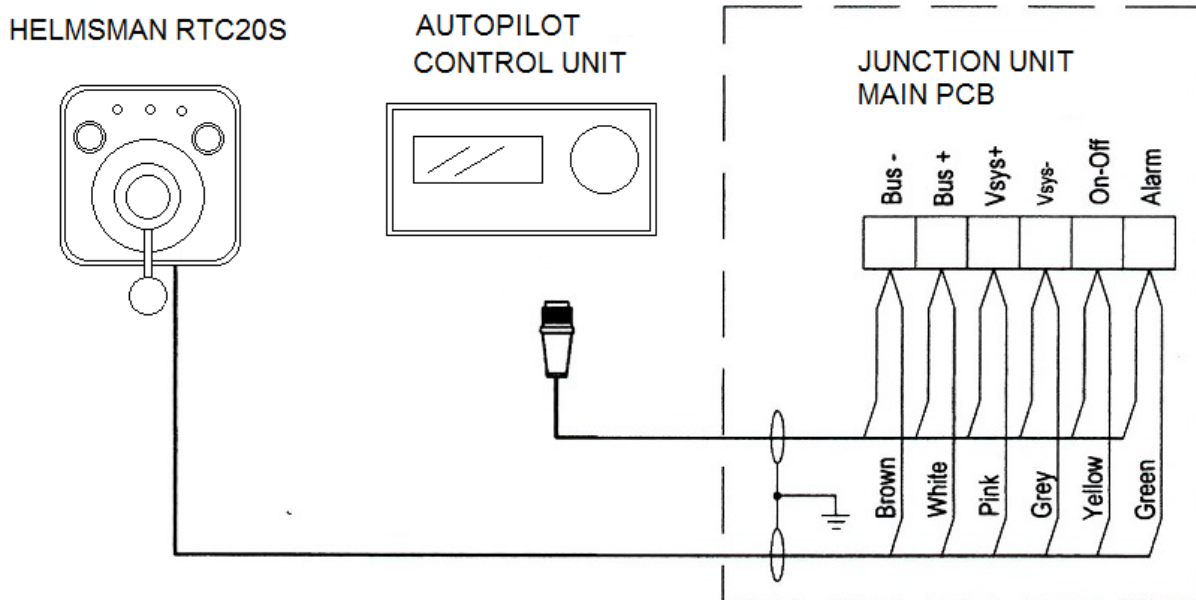


Figure 4 Connection at the junction unit.

After confirming that all connections are secure, the power can be restored and the system can be activated.

[Note: It is assumed that the vessels steering has been working normally prior to these Initial tests.]



Initial tests

- 1) Press the STANDBY/TILLER button to wake the junction-unit processor and observe that the STANDBY indicator blinks slowly.
- 2) Press the AUTO button and observe that the AUTO indicator illuminates. There should be some slight rudder activity while in AUTO mode at dockside.
- 3) Press the STANDBY/TILLER button and observe that the TILLER indicator illuminates.
- 4) Rotate the lever fully clockwise and observe that the rudder moves in the correct direction and stops before reaching the mechanical limit.
 - a) If the rudder moves in the wrong direction, then refer to paragraph, “Changing rudder action in TILLER mode” before proceeding.
 - b) If the rudder moves in the correct direction, but hits the mechanical stops, then a “Dockside Setup” is indicated. Refer to the following paragraph regarding Rudder Limits. Also refer to the Simrad autopilot manual for specific details on performing a Dockside Setup.
- 5) Rotate the lever fully counter-clockwise and observe that the rudder moves in the desired direction and stops just short of the mechanical limits.
- 6) If tests 1 to 5 are not completed satisfactorily then read the following before contacting the manufacturer for support.

Changing rudder action in TILLER mode

If the rudder moves in the opposite direction to that preferred by the operator, do the following.

- 1) Turn off power to the autopilot system.



- 2) Open the RTC20S enclosure by unscrewing the four cover fasteners holding the cover assembly.
- 3) Carefully locate the potentiometer connector as illustrated in figure 3. Reverse this plug 180 degrees and reinsert.
- 4) Replace the cover assembly and secure cover fasteners.

Rudder limits

Maximum rudder deflection is established during the last Dockside Setup procedure. The maximum rudder angle will be 2° less than the maximum angle that can be obtained from the manual helm. This is in order to prevent the rudder hardware from actually reaching its mechanical stops. If the rudder does reach its mechanical stops when operating in TILLER mode then the Dockside Setup should be executed.

Once the Dockside Procedure has been completed, the rudder limits are automatically saved in the junction unit. [*Note: The rudder limit settings are not stored in the steering lever, so no internal adjustments are necessary inside the Helmsman RTC20S.*]

On AP35 autopilots, the maximum angle will also be constrained by the “Rudder Limit LO parameter” in the AP35 “Sea trial Menu”, so if insufficient rudder is achieved while in TILLER mode be sure to inspect this menu setting before performing a Dockside Setup.

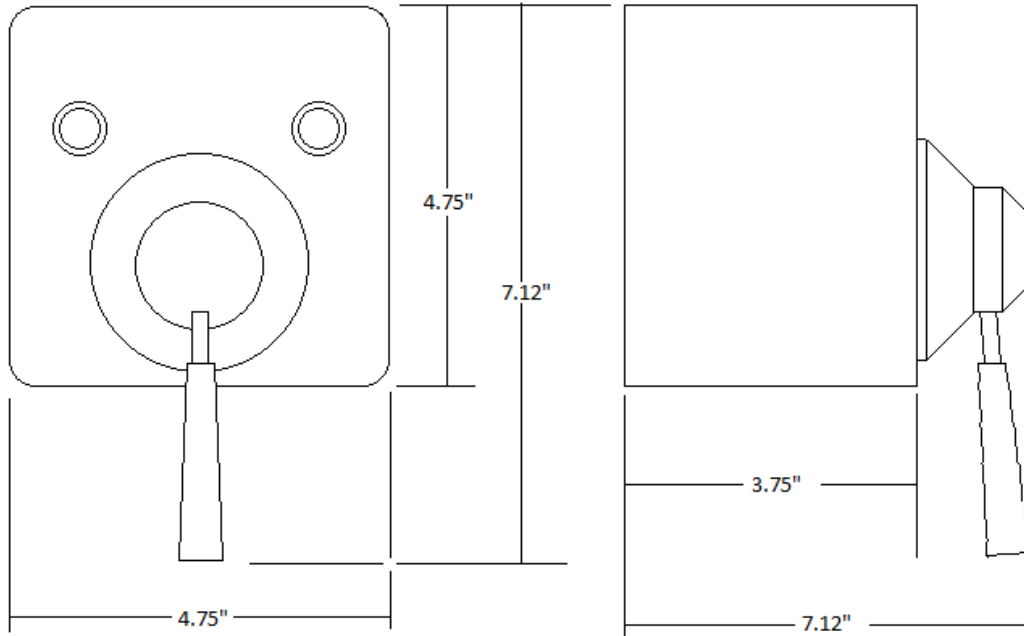
Please refer to the autopilot operator’s manual for more information.

Maintenance and Support

Under normal use, the steering lever will require little maintenance. If the unit requires any form of cleaning, use fresh water and a mild soap solution. It is important to avoid using chemical cleaners and hydrocarbons such as diesel,



petrol, etc. It is advisable at start of each season to check exposed cable runs for damage. Support is available at 907-518-0341 or at 2rainyisland@gmail.com.



Helmsman RTC20 Outline Dimensions

