

# ComNav

## MARINE LTD.

### Heading Rate Stabilizer Part Number 20320005



### Operation & Installation Instructions Version 1.1



## Introduction

Perhaps the single greatest factor affecting Autopilot performance is the quality of the compass heading information it receives. Compass errors due to pitch and roll, high turn-rates, and high-speed turns are common to both fluxgate and magnetic types of compasses.

Northerly Turning Error is another phenomenon that affects both types of compasses. The phenomenon gets worse as you operate at higher latitude, closer to the magnetic poles. It may affect vessels under Autopilot control if the vessel operates under any of the following conditions:

- A magnetic dip of 65 degrees or higher
- Speeds greater than about 20 knots
- On headings nearly due North or South.

Northerly Turning Error occurs when the acceleration of a boat's turn causes the compass card (or fluxgate sensor) to tilt. The card will then sense the vertical component of the earth's magnetic field. This causes the card to rotate.

When a boat is heading north, a magnetic compass card will rotate in the direction that the compass is tilted. If the boat turns to starboard, the compass tips down to starboard and the compass card rotates clockwise. Thus the autopilot thinks the boat has either not changed direction or changed direction less than it actually has. This discrepancy between sensed heading and actual heading leads to poor steering performance.

Going south the effect is reversed. The compass rotates in the opposite direction to the vessel's turn. The autopilot senses a greater turn than has actually occurred. Thus, the autopilot responds more quickly than usual.

In the Southern Hemisphere the same problem occurs. It is called Southerly Turning Error, and the effects of going south and north are reversed from that of Northerly Turning Error.

The Heading Rate Stabilizer measures the horizontal component of the rate of change in the vessel's heading and adjusts the compass reading to minimize the effects of pitch and roll, fast turn rates, and Northerly Turning Error. In this manner, the heading output that is provided to the Autopilot is dramatically improved in terms of dynamic responsiveness and stability, allowing the Autopilot to work more accurately and efficiently.

The ComNav Heading Rate Stabilizer (PN 20320005) is designed to work with ComNav's Fluxgate Compass (PN 92142). This compass has a small, seven-conductor cable plug on the end of it which mates with the Heading Rate Stabilizer's "TO COMPASS" connector.

The Heading Rate Stabilizer is designed to fit seamlessly onto ComNav 1101 and 1001 Autopilot systems. The unit will also work with model 1420, 1440, and 1460 Autopilots, but some modification to the Heading Rate Stabilizer's wiring cable will be necessary. You may wish to obtain the services of a competent technician or an authorized ComNav dealer to make these modifications for you.

## **Installation**

The following pages describe how to install the Heading Rate Stabilizer on your vessel. For information regarding the installation of the complete Autopilot system and/or the Fluxgate Compass, consult your Autopilot "Operation and Installation Manual."

### **Mounting the Heading Rate Stabilizer (applicable to all models of Autopilot)**

Tools required: Drill and Selection of Drill Bits  
Screw Driver, possibly a small wrench depending on hardware used.

Other: Non-corroding screws or nuts and bolts, used to secure the unit.

See your Autopilot User's documentation for guidance on choosing the proper location and mounting method for your ComNav Fluxgate Compass.

Once a suitable location has been selected for the Fluxgate Compass, the Heading Rate Stabilizer should be mounted in close proximity. For best results, it should be located no closer than 40 cm (16") and no farther than 2 m (6 ft) to the Fluxgate Compass.

The Rate Stabilizer must be mounted horizontally. The Heading Rate Stabilizer is not adversely affected by proximity to ferrous metal, so there is no minimum distance to bulkheads or cabinets. ComNav recommends that non-corroding hardware be used to secure the unit.

### **Common Electrical Connections (applies to all models of Autopilot)**

The Heading Rate Stabilizer is supplied with 12m (40 feet) of cable which connects to your Autopilot. Do not shorten the cable on either the Heading Rate Stabilizer or the Fluxgate Compass; excessive cable may simply be coiled up and secured out of the way.

Once the Heading Rate Stabilizer is securely mounted, make the electrical connections described below for the specific model of Autopilot you have.

### **Electrical Connections for 1101 and 1001 Autopilots.**

Tools Required: none.

The Heading Rate Stabilizer is designed to easily connect to ComNav 1101 and 1001 Autopilot systems. The simple connection scheme is illustrated below. Simply plug the Fluxgate Compass cable into the connector on the Heading Rate Stabilizer labeled "TO COMPASS."

Then, for 1101 Autopilots, plug the cable coming out of the Heading Rate Stabilizer labeled "TO AUTOPILOT" onto the connector labeled "COMPASS" on the 1101 SPU (Signal Processing Unit). If you have a 1001 Autopilot, the cable plugs into the "COMPASS" connector on the back of the Autopilot itself.

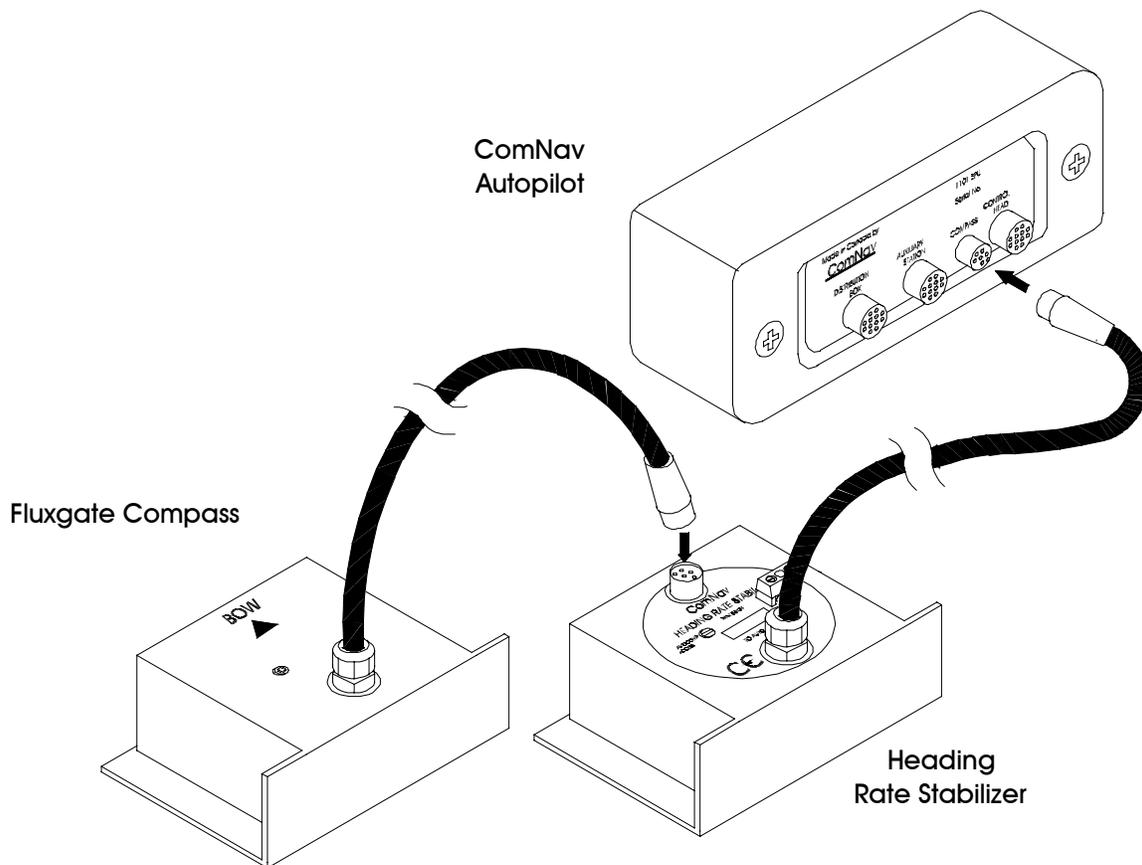


Figure 1 Connection to an 1101 SPU is Quick & Easy.

## Electrical Connections for 1420, 1440, and 1460 Autopilots.

*As stated previously, some modification to the Heading Rate Stabilizer's wiring cable will be necessary to connect the Heading Rate Stabilizer to 1420, 1440, or 1460 Autopilots. You may wish to obtain the services of a competent technician or an authorized ComNav dealer to make these modifications for you.*

Tools required: Wire Cutters  
 Wire Strippers  
 Small sharp utility knife.  
 Medium size Philips Screwdriver  
 Small size Screwdriver.  
 Small Adjustable Wrench

Recommended: Soldering iron and solder

Other: Electrical quality insulating tape or heat-shrink tubing.

Model 1420, 1440, and 1460 Autopilots use a wiring terminal block as connection points on the Processor. Therefore, it is necessary to remove the small circular connector on the end of the Heading

Rate Stabilizer and connect the cable wires directly to the Autopilot terminal block. Follow these steps to accomplish this:

- 1) With a pair of wire cutters, cut the connector off of the end of the Heading Rate Stabilizer cable.
- 2) Note that the cable is shielded; that is, there is fine wire braiding wrapped around the wire conductor bundle. This braiding can be seen just inside the plastic outer jacket of the cable. Just inside the braiding is a group of bare (non-insulated) wire strands lightly twisted together which make up a “drain wire.” It is imperative that this drain wire not be damaged in subsequent steps.
- 3) Trim the plastic outer jacket back from the end of the cable to a distance of about 5 cm (2”).
- 4) Gently unbraid the exposed shielding, and separate the drain wire from it. Trim off the braiding, being sure to leave the drain wire intact.
- 5) Insulate the drain wire, leaving only about 5 mm (1/4”) at the end exposed by wrapping it with tape or covering it with heat-shrink tubing.
- 6) Trim the insulation off of all of the other conductors to a length of 5 mm (1/4”). Note that each conductor is made up of several fine strands of wire. Lightly twist these together after trimming the insulation to prevent them from splaying out.
- 7) If possible, “tin” the ends of the conductors, including the drain wire, with solder to permanently prevent them from splaying out.
- 8) Remove the “End Cap” on the right-hand side of the Autopilot Processor.
- 9) Feed the end of the Heading Rate Stabilizer cable through the gland on the right-hand side of the Autopilot Processor designated for the compass.
- 10) Wire each conductor of the cable into the twelve position terminal block on the Autopilot Processor labeled “J6” according to the chart below. Note that although “J6” is a 12-position terminal block, the Heading Rate Stabilizer uses only 7 of the 12 positions (the other positions are used to connect to the Autopilot Head).

Terminal Block “J6” Pin Number	Conductor Color	Signal
1	Shield Drain Wire	Ground Reference
2	Yellow	DC Cosine level
3	White	Reference Voltage (2.5 VDC)
4	Blue	DC Sine Output
5	Black	Excitation Phase 2 (13.6KHz)
6	Red	Excitation Phase 1 (13.6KHz)
7	Green	+12 Volts DC

*Table 1 Rate Stabilizer Signal Connections for 1420, 1440, and 1460 Autopilots.*

- 11) Check the wiring to be sure there is no possibility of shorts between the wire conductors, and that all connections are secure.
- 12) Reattach the “End Cap” to the Autopilot Processor, and tighten all the cable glands.

## NMEA Connections (applicable to all models of Autopilot)

During normal operation, the Heading Rate Stabilizer provides heading information in NMEA-0183 format at a rate of 10 times per second. This information may be utilized by other electronic devices such as radar.

Connection to the NMEA information is made by means of the terminal block on the top of the Heading Rate Stabilizer labeled NMEA OUTPUT. The terminal labeled "SIG" (signal) conforms to the NMEA-0183 "A" line, while the terminal labeled "RET" conforms to the NMEA-0183 "B" line.

The use of a shielded cable is recommended; the shield may be connected to the RET (return) terminal on the Heading Rate Stabilizer. The shield should be completely isolated from the Autopilot battery negative supply. Further, there should be no connection to the cable shield on any device that the Heading Rate Stabilizer is "talking" to.

Although the signal levels conform to the NMEA-0183 standard of RS-422, connection to RS-232 ports such as found on most Personal and Laptop Computers is also possible. Care must be taken to ensure that the computer's RS-232 port is isolated from the Autopilot battery negative supply. When connecting to the RS-232 port, the terminal labeled "SIG" should connect to the RS-232 port "RX" (receive) line, while the "RET" signal should connect to the "SIGNAL GROUND" line. If a shielded cable is used, the shield may also be attached to the "RET" terminal.

## Operation

### Initial Setup

Once your Heading Rate Stabilizer is installed and wired according to the Installation instructions, you will need to compensate your Fluxgate Compass. This process is done by the software in the Heading Rate Stabilizer and is known as "Automatic Compass Deviation Compensation", or "Autocomp" for short. After Autocomp, the Rate Stabilizer will compensate the compass signals for any magnetic deviation due to influence of the surrounding vessel and the environment.

#### **Attention! Please read the following carefully:**

In order to perform the Autocomp procedure, the Autopilot system must be fully installed and ready to operate. It will be necessary to take the boat out into open water where it can be maneuvered without interruptions. Best results will be obtained if the Autocomp is carried out in the calmest sea conditions possible. Do not attempt to Autocomp near steel bridges, submerged cable, pipe, or other types of structures that produce magnetic anomalies.

Regardless of the Autopilot model you have, the Autocomp process is best executed after performing a "Full Reset." This clears any variable data stored in the Autopilot and ensures that the Heading Rate Stabilizer is given a "clean start." The exact process of doing the "Full Reset" and subsequent Autocomp varies slightly for each model of Autopilot. Follow the instructions below for your specific model.

Once performed, there should be no further need to perform an "Autocomp" again unless:

- a) The fluxgate compass is moved to a different location,
- b) Changes are made to the vessel which affect the compass, or
- c) The vessel is moved to a locale where the Earth's magnetic field strength is sufficiently different so as to cause compass inaccuracies.
- d) The Rate Stabilizer is removed from the system and then re-installed.

## Autocomp for 1101 Autopilots.

Tools Required: Medium size Slot Screwdriver

Other: 1101 Operation & Installation Manual

The Autocomp procedure for 1101 Autopilots is detailed below. The procedure assumes that you have read the 1101 Operation and Installation manual, and are familiar with the operation of the various controls on the Autopilot Head. Note that the procedure given here differs from the "Dockside Setup" in the Autopilot manual because the Autopilot manual does not take into consideration the presence of a Heading Rate Stabilizer.

- 1) Start with the Autopilot power turned "off".
- 2) Gently loosen the nylon screw on the top of the Heading Rate Stabilizer that is labeled AUTOCOMP ACCESS. It is only necessary to loosen the screw a couple of turns. *Do not remove the screw all the way.*
- 3) Turn the Autopilot "on" and place it into STANDBY mode. This is accomplished by pressing and holding the STBY button until the unit "beeps." The lower left portion of the display will show "STANDBY". After a second or so, the main portion of the display will show "No compass Error" and the alarm will sound continuously.
- 4) Perform a "Full Reset" by simultaneously pressing and holding the TURN RATE, RUDDER, and STBY buttons. The Autopilot responds by canceling the alarm and showing the words "FULL RESET – Redo rudder setup" on the display.
- 5) Follow the procedure for rudder setup as prompted on the Autopilot display. Refer to your Autopilot manual if you have any problems.
- 6) After the rudder setup, the Autopilot will prompt you with a choice between "Setup compass" and "Exit." Use the rotary knob to select "Setup compass" and then press the SPEED button. The Autopilot display will now show three types of compasses: Magnetic, Fluxgate, and Special Fluxgate.
- 7) Use the rotary knob to select "Fluxgate. Then press the SPEED button. The Autopilot responds by offering a choice to "Adjust compass" or "Exit."
- 8) Select "Adjust Compass" by using the rotary knob and then press the SPEED button. The Autopilot display will then show "Turn vessel 360 degrees."
- 9) Turn the boat slowly around in complete circles. Rate of turn should be kept between 3 and 10 degrees per second. It will be necessary to complete 2-1/2 to 3 circles while the Heading Rate Stabilizer learns the compensation factors for your particular installation. It does not matter whether the vessel is turned to port or to starboard, but you must make all the circles in the same direction without doubling back.
- 10) Once the Heading Rate Stabilizer has finished the Autocomp process, the Autopilot will display the message "Finished Dockside Setup," and shortly thereafter switch back into STANDBY mode. The display will show the current compass heading.

If the vessel has completed more than 3-1/2 full 360 degree turns and the Autopilot Display does not show "Finished Dockside Setup," then there is more deviation than can be compensated for. It is likely that this situation can be remedied by moving the Fluxgate Compass to a better location. After relocating the compass, start this procedure over starting with Step 1.

If instead of "Finished Dockside Setup" the display shows "Move compass", then you have probably completed your circles too fast. Redo the procedure starting with step 1. When the vessel is "turned" in step 9, use a slower rate of turn.

- 11) Shut off the Autopilot by pressing and holding the STBY button for at least two seconds.
- 12) Retighten the AUTOCOMP ACCESS screw. It must be screwed in all the way until the shoulder of the screw-head is completely flush with the face of the unit's label. Do not over-tighten, as this will strip the threads from the screw.
- 13) Test the operation of the Heading Rate Stabilizer by once more turning on the Autopilot and placing it in STANDBY mode. If everything is working, you will see the compass heading displayed on the LCD screen. If you get a "No compass Error", repeat steps 11 through 13.

This completes the Heading Rate Stabilizer Autocomp procedure for an 1101 Autopilot. Proceed to the section entitled Normal Usage.

## Autocomp for 1001 Autopilots.

Tools Required: Medium size Slot Screwdriver

Other: 1001 Operation & Installation Manual

The Autocomp procedure for 1001 Autopilots is detailed below. The procedure assumes that you have read the 1001 Operation and Installation manual, and are familiar with the operation of the various controls on the Autopilot Head. Note that the procedure given here differs from the "Dockside Setup" in the Autopilot manual because the Autopilot manual does not take into consideration the presence of a Heading Rate Stabilizer.

- 1) Start with the Autopilot power turned "off".
- 2) Gently loosen the nylon screw on the top of the Heading Rate Stabilizer that is labeled AUTOCOMP. It is only necessary to loosen the screw a couple of turns. *Do not remove the screw all the way.*
- 3) Perform a "Full Reset" by turning the Autopilot to STANDBY, and then pressing and holding both the UP and DOWN arrow keys. After about two seconds, the Autopilot will respond by displaying **[FrSt]** on the LCD screen. This will shortly be replaced by the message **[rSEt]**.
- 4) Press the ADJUST key once. The Autopilot responds by showing **[HO S]** (Hard Over Starboard) on the display.
- 5) Follow the procedure for rudder setup as prompted on the Autopilot display. Refer to your Autopilot manual if you have any problems.
- 6) After the rudder setup, the Autopilot will display **[CSEt]** as a prompt for you to select the type of compass. Press the ADJUST key and use the UP or DOWN arrow key until the display shows **[CPS2]**.
- 7) Press the ADJUST key once more. The display will show the message **[CAdJ]**
- 8) Press the ADJUST key once more. The display will begin to flash the message **[tUrn]**

- 9) Steer the boat slowly around in complete circles. Rate of turn should be kept between 3 and 10 degrees per second. It will be necessary to complete 2-1/2 to 3 circles while the Heading Rate Stabilizer learns the compensation factors for your particular installation. It does not matter whether the vessel is turned to port or to starboard, but you must make all the circles in the same direction without doubling back.
- 10) Once the Heading Rate Stabilizer has finished the Autocomp process, the Autopilot will momentarily sound the audible alarm, display the message **[dOnE]** and then automatically switch out of DOCKSIDE mode and into STANDBY mode.  
  
If the vessel has completed more than 3-1/2 full 360-degree turns and the Autopilot display does not show **[dOnE]**, then there is more deviation than can be compensated for. It is likely that this situation can be remedied by moving the Fluxgate Compass to a better location. After relocating the compass, start this procedure over beginning with step 1.  
  
If instead of **[dOnE]**, the display shows **[nOVE]** (“move”), then you have probably completed your circles too fast. Redo the procedure starting with step 1. When the vessel is “turned” in step 9, use a slower rate of turn.
- 11) Shut the Autopilot “off.”
- 12) Retighten the AUTOCOMP ACCESS screw. It must be screwed in all the way until the shoulder of the screw-head is completely flush with the face of the unit’s label. Do not over-tighten, as this will strip the threads from the screw.
- 13) Test the operation of the Heading Rate Stabilizer by once more turning on the Autopilot and placing it in STANDBY mode. If everything is working, you will see the compass heading displayed on the LCD screen. If you get a **[nCEr]** (“No Compass Error”), repeat steps 11 through 13.

This completes the Heading Rate Stabilizer Autocomp procedure for a 1001 Autopilot. Proceed to the section entitled Normal Usage.

## Autocomp for 1440 and 1460 Autopilots.

Tools Required: Medium size Slot Screwdriver

Other: 1440/1460 Operation & Installation Manual

The Autocomp procedure for 1440 and 1460 Autopilots is detailed below. The procedure assumes that you have read the 1440/1460 Operation and Installation manual, and are familiar with the operation of the various controls on the Autopilot Head. Note that the procedure given here differs from the “Dockside Setup” in the Autopilot manual because the Autopilot manual does not take into consideration the presence of a Heading Rate Stabilizer.

- 1) Start with the Autopilot power turned “off”.
- 2) Gently loosen the nylon screw on the top of the Heading Rate Stabilizer that is labeled AUTOCOMP ACCESS. It is only necessary to loosen the screw a couple of turns. *Do not remove the screw all the way.*
- 3) Perform a “Full Reset” by pressing and holding the small (inset) FLUSH key and then holding the PILOT key until the display on the Control Head shows **[FrSt]**.

- 4) Release both keys. The Autopilot responds by showing **[HO S]** (Hard Over Starboard) on the display.
- 5) Follow the procedure for rudder setup as prompted on the Autopilot display. Refer to your Autopilot manual if you have any problems.
- 6) As the last part of the rudder setup, you will be prompted to bleed the hydraulic system by the message prompt **[bLEd]**. Use the PORT and STARBOARD keys to bleed the system if desired, and then press the SET key. The Autopilot will respond by showing **[nCEr]** (“No Compass Error”) on the display.
- 7) Turn the boat slowly around for about 2-1/2 circles. It does not matter whether the vessel is turned to port or to starboard, but you must make all the circles in the same direction without doubling back. Rate of turn should be kept between 3 and 10 degrees per second.
- 8) Press the PILOT key once. The Autopilot will display the message **[FLUH]** (“Fluxgate”) and then the flashing **[TURN]**.  
Continue to steer the boat slowly in the same direction as before. After approximately one more circle, the Heading Rate Stabilizer will have finished the Autocomp process. The Autopilot will respond by momentarily sounding the audible alarm and displaying the message **[nOrt]** (“North”) on the LCD screen.  
If the vessel has completed more than 3-1/2 full 360-degree turns (counting from step 7) and the Autopilot display does not show **[nOrt]**, then there is more deviation than can be compensated for. It is likely that this situation can be remedied by moving the Fluxgate Compass to a better location. After relocating the compass, start this procedure over beginning with step 1.
- 9) Once the Autopilot display shows **[nOrt]**, point the vessel on a heading of 0 degrees (due north). Then press the SET key. The Autopilot will automatically shut off.
- 10) Retighten the AUTOCOMP ACCESS screw. It must be screwed in all the way until the shoulder of the screw-head is completely flush with the face of the unit’s label. Do not over-tighten, as this will strip the threads from the screw.
- 11) Test the operation of the Heading Rate Stabilizer by turning on the Autopilot and placing it in STANDBY mode. If everything is working, you will see the compass heading displayed on the LCD screen. If you get a **[nCEr]** (“No Compass Error”), shut off the Autopilot and repeat steps 10 and 11.

This completes the Heading Rate Stabilizer Autocomp procedure for 1440 and 1460 Autopilots. Proceed to the section entitled Normal Usage.

## **Autocomp for 1420 Autopilots.**

Tools Required: Medium size Slot Screwdriver

Other: 1420 Autopilot Operation & Installation Manual

The Autocomp procedure for 1420 Autopilots is detailed below. The procedure assumes that you have read the 1420 Operation and Installation manual, and are familiar with the operation of the various controls on the Autopilot Head. Note that the procedure given here differs from the “Dockside Setup” in the Autopilot manual because the Autopilot manual does not take into consideration the presence of a Heading Rate Stabilizer.

- 1) Start with the Autopilot power turned “off”.
- 2) Gently loosen the nylon screw on the top of the Heading Rate Stabilizer that is labeled AUTOCOMP. It is only necessary to loosen the screw a couple of turns. *Do not remove the screw all the way.*
- 3) Perform a “Full Reset” by pressing and holding the SPEED key and then holding the PILOT key. The Autopilot will signify a Full Reset by flashing the green light under the STARBOARD key.
- 4) Follow the procedure for rudder setup as stated in the 1420 Operation and Installation manual. After the “bleed” procedure is completed, press the SPEED key once. The Autopilot will respond by flashing the orange light above the PILOT key. This indicates a “No Compass Error.”
- 5) Steer the boat slowly around for about 2-1/2 circles. . Rate of turn should be kept between 3 and 10 degrees per second. It does not matter whether the vessel is turned to port or to starboard, but you must make all the circles in the same direction without doubling back.
- 6) Press the PILOT key once.

Continue to steer the boat slowly in the same direction as before. After approximately one more circle, the Heading Rate Stabilizer will have finished the Autocomp process. The Autopilot should respond by shutting off the orange light above the PILOT key and commencing to flash the orange light below the SPEED key.

If the vessel has completed more than 3-1/2 full 360-degree turns (counting from step 5) and the Autopilot display does not show a flashing orange light below the SPEED key, then there is more deviation than can be compensated for. It is likely that this situation can be remedied by moving the Fluxgate Compass to a better location. After relocating the compass, start this procedure over beginning with step 1.

- 7) Once the Autopilot display shows the flashing light below the SPEED key, point the vessel on a heading of 0 degrees (due north). Then press the SPEED key. The Autopilot will automatically shut off.
- 8) Retighten the AUTOCOMP ACCESS screw. It must be screwed in all the way until the shoulder of the screw-head is completely flush with the face of the unit’s label. Do not over-tighten, as this will strip the threads from the screw.
- 9) Test the operation of the Heading Rate Stabilizer by once more turning on the Autopilot and placing it in PILOT mode. If you get all of the lights on the Control Head flashing except for the one above the PILOT key (which will be on steadily) then (indicating a “No Compass Error”), shut off the Autopilot and repeat steps 8 and 9.

This completes the Heading Rate Stabilizer Autocomp procedure for 1420 Autopilot. Proceed to the section entitled Normal Usage.

### **Normal Usage (applies to all models of Autopilot)**

In Normal Usage, the AUTOCOMP ACCESS screw must be turned (clockwise) all the way in. When the Autopilot is turned on, the Rate Stabilizer will also be turned on and begin operation.

Initially, there is a short period of time during which the Rate Stabilizer looks for the sine and cosine signals from the fluxgate compass, “locks on” to them, and begins the process of “stabilizing” them. The process of “locking on” may take up to about twenty seconds.

During the time it takes to “lock on,” the Rate Stabilizer will pass through “unstabilized” sine and cosine signals from the Fluxgate Compass to the Autopilot. These signals will be compensated for the effects of hard and soft iron; but because they are “unstabilized,” they are only as accurate as if the Fluxgate Compass were being used without the Rate Stabilizer.

During the time it takes to “lock on,” the Rate Stabilizer will not output any data through the NMEA OUTPUT.

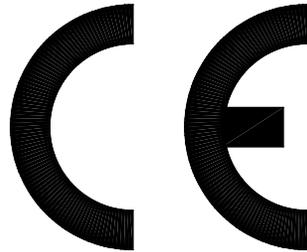
Once the Heading Rate Stabilizer has “locked on,” it will automatically switch over the output to the stabilized sine and cosine signals. This may result in a slight “jump” of a few degrees on the Autopilot display as the sine and cosine signals are switched to their “stabilized” levels. If the Autopilot is in PILOT mode, the jump in heading will result in a course correction.

## **Care & Maintenance.**

There are no user-serviceable parts or adjustments inside the Heading Rate Stabilizer enclosure. When the AUTOCOMP ACCESS screw is turned in all the way, the unit is watertight. Should the unit become damaged in any way, return it to an authorized ComNav Marine dealer.

A few precautions will keep the unit in prime condition and result in years of trouble-free service:

- The Heading Rate Stabilizer is contained within an ABS housing which does not require any special maintenance other than an occasional cleaning.
- Connections to the NMEA Output terminals should be kept clean and tight. A silicone lubricant approved for use on electrical/electronic wiring should be applied periodically to displace water and prevent corrosion.
- Except for when the Automatic Compass Compensation procedure is being performed, the nylon screw labeled AUTOCOMP ACCESS should be turned in (clockwise) all the way to seal the unit against the ingress of moisture. Use caution when tightening this screw, as excessive torque will strip the threads. The screw is designed specifically for use on the Heading Rate Stabilizer. Do not substitute ordinary screws should it become lost.



This product has been tested and is in compliance with the Electro-Magnetic Compatibility (EMC) standards of the European Community and bears the CE label. It has been tested according to the applicable sections outlined under;

Technical standard #IEC945/EN60945  
Marine Navigation Equipment  
General Requirements

Applicable sections for methods of testing and required test results are;

	Section 4.5.4:	Radiated Interference
	Section 4.5.4:	Immunity to Electro-magnetic Environment
Annex A,	Section A.3:	Immunity to conducted audio frequencies
Annex A,	Section A.4:	Immunity to earth lead coupling
Annex A,	Section A.6:	Immunity to radiated interference

Test results and a declaration of conformity are on file at the ComNav plant;

ComNav Marine Ltd.  
#15 - 13511 Crestwood Place  
Richmond, BC V6V 2G1  
Canada

## Heading Rate Stabilizer (PN 20320005) Specifications \*\*\*

Supply Voltage	10 to 16 VDC
Supply Current	55 mA nominal
Compass Input	Sine/Cosine type Minimum Sin/Cos Swing : +/- 0.625 VDC Minimum Reference Voltage: 2.0 VDC Maximum Sin/Cos Swing: +/- 4.0 VDC Maximum Reference Voltage: 4.0VDC
Sine/Cosine Output	Sine/Cosine type Sin/Cos Swing : +/- 1.25 VDC Reference Voltage: 2.5 VDC
NMEA Output	NMEA 0183 version 2.30 "HDM" and "HDG" RS422 driver , 4800 baud, data repeated at 10 Hz rate
Heading Accuracy	+/- 1 degree typical
Repeatability	0.25 degrees
Resolution	0.1 degrees
Tilt Angle/Pitch & Roll Range	45 degrees
Maximum Angular Velocity	60 degrees per second
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +100°C
Mounting	Integrated Bracket for Deck or Bulkhead Surface
Dimensions (maximum, without cable)	142 mm X 107 mm X 76 mm (5.6" X 4.2" X 3.0")
Weight (without cable)	312 grams (11 ounces)
Safe Distance To Compass	40 cm (16 inches)
Compass Compensation provided	Automatic; compensates for both Permanent and Soft Magnetism.

Table 2: Rate Stabilizer Specifications

\*\*\* Specifications subject to change without notice.