ComNav marine ltd

ComNav SSRC1

Tri-Axis Rate Gyro Compass

Patents Pending

Installation & Operation Manual

Certified System

ISO 9001

PN 29030051 V1
17-472-03 rev.01
09-01-10

Table of Contents

***IMPORTANT**: Please read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.*

Introduction

Thank you for purchasing ComNav's Tri-Axis Rate Gyro Compass. This exciting product is actually three sensors in a single unit—a three-axis magnetic compass, a three-axis accelerometer, and a three-axis rate gyro. The compact housing is waterproof with a single removable cable. Data is output in digital NMEA 0183 and NMEA 2000® formats.

Functions

- Magnetic compass heading
- Angle of vessel pitch (attitude)
- Angle of vessel roll (attitude)
- Rate of Turn

Features

- Waterproof housing
- Waterproof cable system
- Fast response time
- Simultaneously outputs data in NMEA 0183 and NMEA 2000® formats
- Stable and accurate data in dynamic conditions
- Can be programmed to compensate for an installation that is not aligned to the bow of the vessel and/or level
- Can be calibrated to compensate for magnetic deviation caused by ferrous metals and other electro-magnetic fields
- Bracket or flush mount

WARNING

Navigation Aid Only—The sensor is only an aid to navigation and should never be solely relied upon. It is not a replacement for traditional navigation aids and techniques, and human judgement. Only official government nautical charts contain all the information needed for safe navigation.

Follow the safety precautions below to reduce the risk of poor product performance, property damage, personal injury, and/or death.

WARNING: **Correct Installation Important**
The compass must be installed and operated according to the instructions in this owner's guide.

WARNING: **Compass Safe Distance**
The compass must be a minimum of 0.3m (1') from other standard and steering compasses.

WARNING: **Do Not Install Near Magnetic Field**
Do not install in a steel vessel [ferrous (magnetic) hull]. Observe a safe distance from ferrous metals and anything that can create a magnetic field to prevent interference to the magnetic compass.

WARNING: **Electrical Safety**
The power supply must be OFF before making electrical connections.

WARNING: **Voltage**
The power supply voltage must be 12VDC.

WARNING: **Battery**
Make power connections to a power source that is isolated from the engine start battery(s). Voltage drops may cause the compass to lose information and/or change operating mode.

WARNING: **Fuse or Circuit Breaker**
A safe installation requires a 0.5amp fast-blow fuse or circuit breaker.

WARNING: **Installation Safety**
Always wear safety goggles and a dust mask when installing.

WARNING: **Status LED**
The flickering LED only shows that data is being received on the NAV1/NAV2 Port. It does not mean that the data received is valid.

WARNING: **Calibrating the Compass**
The internal compass may need to be calibrated on the water after the sensor is installed. Perform the pretest to determine if calibration is necessary.

Compass Cables

- NMEA 0183 Cable 10m Part No. 31510002
- NMEA 2000® Cable 6m Part No. 31510007
- Optional NMEA 2000® Cable 10m Contact factory

Tools & Materials

Safety goggles
Dust mask
Torpedo level
Pencil
Electric drill
Drill bits and hole saws:
- Pilot hole 3mm *or* 1/8"
- Bracket screw holes 4mm, #23, *or* 9/64"
- Flush mount stud holes 6mm *or* 1/4"
- Flush mount cable hole 38mm *or* 1-1/2"

Phillips screwdrivers
Marine sealant (aluminum hull)
Loctite® 242® *or* other removable thread locker (Flush Mount installation)
Deck gland (some installations)
Grommets (some installations)
Cable ties (some installations)
Multimeter (some installations)

Choosing the Mounting Location

For accurate readings, selecting the best location for the compass is very important. It can be mounted on either a vertical or a horizontal surface. Choose a location that balances the requirements below.

- Mount the compass as close to the boat's center of gravity as possible. The lower it can be mounted, the more stable it will be, thus giving more accurate compass readings.
- Mount near the center of the vessel's fore-aft axis. This will give more accurate pitch and roll readings. Avoid the areas near the bow and the stern.
- To prevent interference to the magnetic compass:
  - Mount a minimum of 0.3m (1') from other standard and steering compasses.
  - Mount away from any structures or equipment that contains ferrous metals.
  - Mount away from anything that may create a magnetic field such as: magnetized materials, electric motors, electronic equipment, boat engines, generators, power/ignition cables, and batteries. For distances, follow the respective manufacturer's recommendations.
  - *Do not install in a steel vessel (magnetic hull).*
- Choose a surface with minimal vibration for more stable data.
- Mount reasonably level with the waterline for accurate pitch and roll readings.

Installing

CAUTION: The word 'FORWARD' on the compass must be facing forward and parallel to the centerline of the boat for accurate compass readings.

CAUTION: Mount the compass near the center of gravity of the boat and reasonably level with the waterline for accurate pitch and roll readings.

IMPORTANT: Plan the cable route between the compass and the display and/or network before beginning the installation.

Mounting on a Vertical Surface

Mounting the Bracket

1. At the selected mounting location, draw a level line using a torpedo level (see Figure 1).
2. Holding the bracket even with the level line, trace the outline of the two vertical slots. *Do not mark the location of the two interior screw holes at this time.*
3. Using a 3mm or 1/8" bit, drill the pilot holes in the CENTER of the slots. This will allow you to adjust the bracket up and down.
4. Using a 4mm, #23, or 9/64" bit, drill the two mounting holes.
   Fiberglass—Minimize surface cracking by running the drill in reverse until the gelcoat is penetrated.
5. Lightly fasten the bracket to the mounting surface with two of the stainless steel screws supplied. Place the torpedo level on the top of the bracket. Adjust the bracket until it is level. Tighten the screws.
   Aluminum hull—Apply marine sealant to the threads of all four stainless steel screws before fastening them in place. This will prevent electolytic corrosion between the dissimilar metals.
6. Using a 3mm or 1/8" bit, drill the pilot holes for the two center screws. Then use a 6mm or 1/4" bit to drill the holes.
7. Fasten the remaining two stainless steel screws in the center holes to lock the bracket in place.

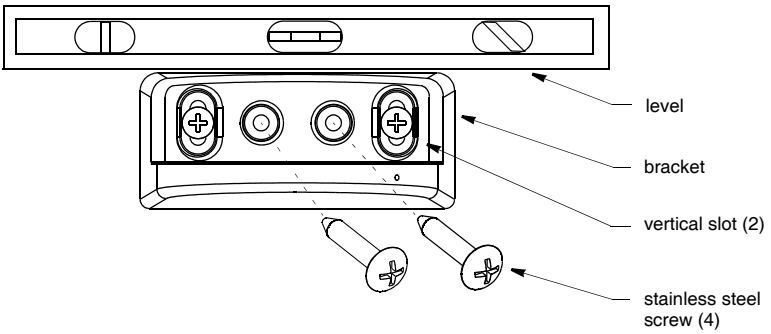

Figure 1. Mounting the bracket

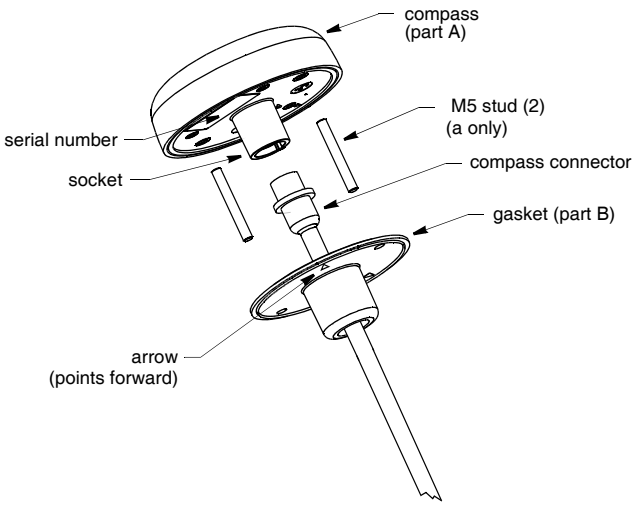

Figure 2. Preparing the compass

Preparing the Compass

WARNING: Do not use the studs if there is any danger that a person may be injured by the protruding metal.

1. Remove the label from over the compass's socket (part A) (see Figure 2).
2. There are two ways to attach the compass to the bracket. Choose either a or b.
   a. **Studs**—It is easier to install and adjust the compass using the M5 studs. However they will protrude about 20 mm (3/4") below the bracket after installation. Apply *removable* thread locker to the two studs. Screw the studs into the underside of the compass.
   b. **Screws**—Omit the studs. After the compass is aligned in the bracket, use the brass machine screws supplied to fasten it in place. The compass will be flush with the bracket when the installation is complete.
3. Remove the protective cap from the *compass* connector on the cable. (Save the cap to protect the connector, when the compass is removed.)
4. Pass the *instrument* connector-end of the cable through the center of the gasket.
5. Plug the compass connector firmly into the compass. It fits one way only.
6. Push the gasket (part B) against the compass (and onto the studs if applicable). Be sure to orient the gasket so that the groove fits over the alignment tab on the connector and the compass's socket. The screw holes in both the compass and the gasket must be aligned. (It may be helpful to hold the gasket in place with double-sided tape.)

   ***NOTE**: The arrow on the gasket will face the same direction as the word 'FORWARD' on the compass.*

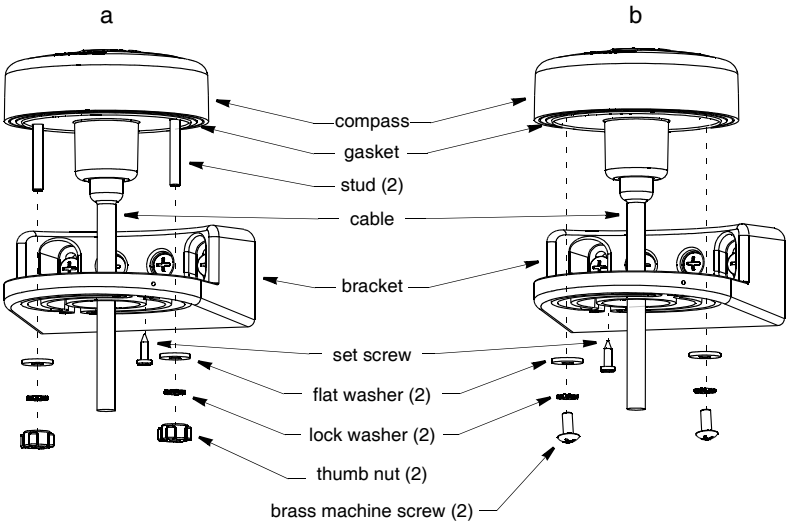

Figure 3. Installing the compass in the mounting bracket

Attaching the Compass to the Bracket

1. Feed the cable through the mounting bracket (see Figure 3).
2. Align the word 'FORWARD' pointing forward and parallel to the centerline of the boat while holding the gasket firmly against the compass.
   a. **Studs**—Push the studs through the mounting bracket. Fasten the compass to the bracket with a flat washer, a lock washer, and a thumb nut (with the metal side against the washer) on each stud. **Hand-tighten** only. *Do not* over tighten.
   b. **Screws**—Place the compass on the bracket, being sure the screw holes in both the compass and the gasket are aligned. From the underside of the bracket, fasten the compass with the two flat washers, lock washers, and brass machine screws supplied.
3. Be sure the word 'FORWARD' on the compass is pointing forward and parallel to the centerline of the boat. To prevent the compass from rotating after it is aligned in the bracket, fasten the 1/2" pan-head set-screw into the most convenient of the two alternative holes.

Flush Mounting on a Horizontal Surface

1. Remove the label from over the compass's socket (part A) (see Figure 4).
2. Apply *removable* thread locker to the two studs supplied. Screw the studs into the underside of the compass.
3. Using a torpedo level, check that the mounting surface is reasonably level. If necessary, use shims to level the surface or choose another mounting location.
4. Using the gasket (part B) as a template, position it at the selected mounting location *upside down with the arrow facing forward and parallel to the centerline of the boat*. Mark the position of the two mounting holes and the center cable hole.
5. Using a 3mm or 1/8" bit, drill the pilot holes. Using a 6mm or 1/4" bit, drill the two mounting holes for the studs. Drill the cable hole with a 38mm or 1-1/2" hole saw. **Fiberglass**—Minimize surface cracking by running the drill in reverse until the gelcoat is penetrated.
6. Pass the *instrument* connector-end of the cable through the center of the gasket and down through the center mounting hole in the boat.
7. Plug the compass connector firmly into the compass's socket.
8. Orient the gasket with the arrow facing in the same direction as the word 'FORWARD' on the compass. Push the gasket onto the studs and slide it over the connector.

   NOTE*: The gasket fits one way only. A groove in the gasket fits over the alignment tab on the connector.*
9. With the word 'FORWARD' pointing forward and parallel to the centerline of the boat, push the studs through the mounting surface. *Check to be sure the gasket is tucked under the lip of the compass.* From underneath the mounting surface, slide a flat washer and lock washer onto each stud. Fasten them with the thumb nuts: metal side touching the washer. **Hand-tighten** only. *Do not* over tighten.

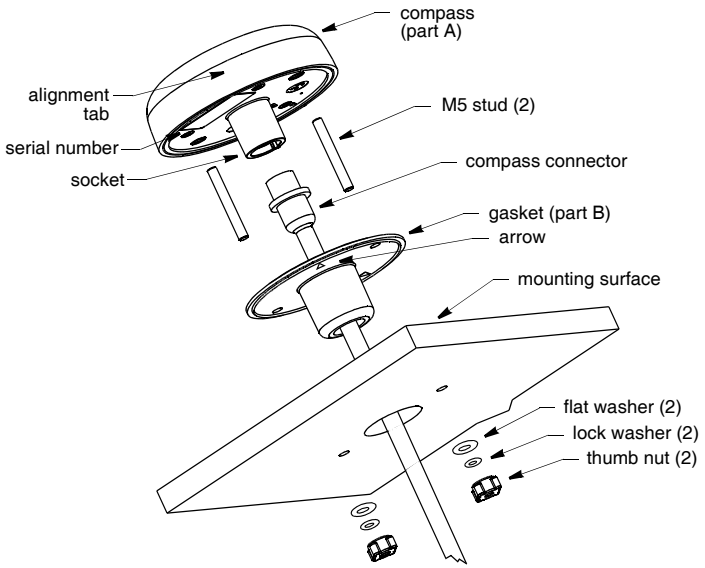

Figure 4. Flush mount

Cable Routing & Connecting

CAUTION: Connect the compass to the NAV1 port, so the compass can be calibrated on the water from the autopilot. If the compass is connected to the NAV2 port, you will have to use WeatherCaster® software and a PC.

CAUTION: To reduce electrical interference from other electrical wiring and any equipment with a magnetic field such as electric motors, electronic equipment, engines, generators, power/ignition cables, and batteries; separate the cables by at least 1m (3').

CAUTION: Do not remove the waterproof connector(s) to ease cable routing. If the cable must be cut and spliced, use a water-tight junction box and follow the instructions supplied. Removing the waterproof connector or cutting the cable, except when using a water-tight junction box, will void the compass warranty.

CAUTION: Be careful not to tear the cable jackets when passing them through bulkheads and other parts of the boat. Use deck glands and grommets to prevent chaffing.

CAUTION: Use a multimeter to check the polarity and the connections to the 12VDC power supply before applying power to the compass.

CAUTION: Coil any excess cable(s) and secure with cable ties to prevent damage.

Connecting the Compass—P Series Autopilot

Connect the compass to the autopilot at the recommended **NAV1** Port following the wiring diagram below (see Figure 5).

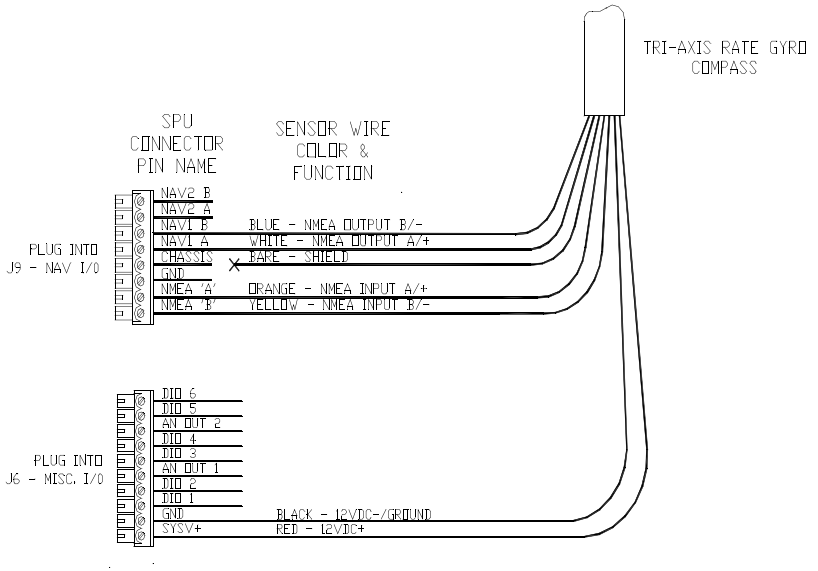

Figure 5. P Series SPU wiring diagram

Signal Names

The names of the NMEA data signals and the paired wires carrying them are specified as A and B (see Table 1). The autopilot's signal processing unit (SPU) uses these names on the J9, Nav I/O connector.

Table 1. NMEA Signal Translation Guide

NMEA Name	J9 Connector Label	Function	Alternative Names
A signal	in 1A or in 2A out A	Positive voltage with respect to B is a logical 0 (Active or Space or ON[a]	+ or NMEA + SIG or SIGNAL POS or +VE
B signal	in 1B or in 2B out B	Positive voltage with respect to A is a logical 1 (Idle or Mark or OFF	- or NMEA - RTN or Return NEG or - VE

a. An NMEA 0183, serial, data stream is inverted by the transmitter and inverted again by the receiver. A logical 1 in the data appears as a logical 0 on the A/B wire pair.

RS422 Electrical Interface

The RS422 electrical interface specified in the NMEA 0183 Standard uses a pair of balanced signals (differential signals) in paired wires. There is an A signal on one wire and a complementary B signal on the other. It is necessary to maintain the correct signal polarity when connecting the compass's input and output wire pairs to the SPU.

1. Connect the A output wire of the compass to the input-port signal-pin A on the SPU. Connect the B output wire of the compass to the B input pin

   ***NOTE**: There is no ground wire for the Nav-IN port. The port is an NMEA Listener as defined in the Standard. It is optically isolated from the rest of the SPU circuitry; it needs only the A and B signal pair to function properly.*

2. Similarly, the A and B input wires from the compass must be connected to the SPU's output-port A and B signal pins.

   ***NOTE**:*

   - The SPU's Nav-Out port (an NMEA Talker) is not optically isolated from the rest of the SPU circuitry. However since the compass has an optically-isolated input (it is a fully compliant NMEA Listener), no ground wire for the Nav-Out port is necessary.
   - The ground reference voltage for the output signals is available on the GD pin of J9. But this is not the SPU's signal ground. Rather it is a synthesized reference voltage, so *it must not be connected to any other ground*.
   - The CH pin on the J9 connector is connected directly to the SPU chassis. And it is also AC-connected to the SPU's signal ground via a 100 nF capacitor. If the cable carrying the Nav signal wires from/to the compass is shielded, the shield should be wired to the CH pin. *Note that the cable's shield must not be connected at the other end or anywhere other than the J9 connector's CH pin*.

Status LEDs

WARNING: The flickering LED only shows that data is being received on the NAV1/NAV2 Port. It does not mean that the data received is valid.

When the autopilot is turned ON, the Status LED labeled NMEA IN #1 in the SPU's Diagnostic Section will be flashing whenever the autopilot is receiving data from the NAV1 - IN Port. (Similarly, if the autopilot is receiving data from the NAV2 - IN Port, the NMEA IN #2 LED will be flashing.)

The LED will flash at a rate of about ten times per second when connected to the Tri-Axis Rate Gyro Compass. It will flash at a rate of about once per second for data from a GPS or chartplotter.

If the LED is flashing but you are seeing an INVALID or NO DATA error message and you are sure the compass is sending valid data, check the wiring. Try reversing the wire pair connected to the J9 connector of the NAV1-IN Port (or NAV2 - IN Port if connected to the compass). If you are still seeing an error message, something else is wrong. Contact your ComNav dealer for assistance.

***NOTE**: If the A and B wires are connected in reverse, the LED will still flicker. However when the NAV1 Port (or NAV2 Port if connected to the compass) is selected later as the compass source in the standby menu, no heading will be displayed and a NO HEADING alarm will occur. If this is the case, simply swap the A and B wires.*

Compass Setup—Dockside

1. Start the autopilot. When the Fn line is highlighted, press the Fn button. You will see a menu of compasses that are compatible with the autopilot. Highlight SSRC1; then press Fn.
2. Highlight Compass Setup; then press Fn. The list of all four compass *sources* will be displayed.
3. Highlight the compass source, NAV1 Port (or NAV2 Port if used). Press Fn (see Figure 6). The autopilot will search for the compass.

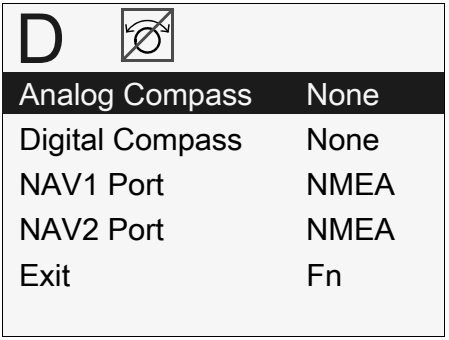

Figure 6. Supported compass sources

Calibrating the Compass

WARNING: The compass may need to be calibrated on the water after the sensor is installed. Perform the pretest to determine if calibration is necessary.

CAUTION: The Pretest and AutoCalibration Procedure must be done in calm seas in a 0.8 km (0.5 mile) open area away from other boats and ferrous objects such as structures and aids to navigation. Avoid congested areas and waters with strong currents as calibration will be difficult and possibly hazardous.

Pretest

While making a full circle with the boat, compare the SSRC1 data to the boat's compass. Check all headings. If the data agrees, there is no magnetic influence on the SSRC1. It does NOT need to be calibrated.

AutoCalibration Procedure

Connect the compass to the Nav1 Port and follow the AutoCalibration Procedure below.

IMPORTANT: Calibration requires the vessel to complete 2 to 3 circles.

IMPORTANT: In the event of a calibration failure, repeat the procedure.

1. Navigate the vessel to an open area of water, 0.8 km (0.5 mile) of open space away from other boats or ferrous objects (structures or aids to navigation). Choose calm seas.
2. Select the display page on the ComNav autopilot that shows Heading.
3. Shut OFF and then turn ON the DC power that is connected to the compass.
4. Within 2 minutes of recycling power to the compass, start the vessel in a slow [4 to 6 knots (4.5 to 7 MPH)] circular turn that takes about 2 to 3 minutes to complete.*

   If the vessel completes 1.5 circles within 3 to 4.5 minutes, AutoCalibration will begin. Heading will stop being reported on any NMEA 0183 or NMEA 2000 display until the calibration is finished.
5. Keep turning the vessel in the same circle for 1 to 2 more complete circles. *Do not change the vessel speed or rate of turn through the circle.*
6. When calibration is completed successfully, Heading will return to the display.

   If calibration fails, the display will flash Heading ON and OFF in 10 second intervals for 60 seconds. (Display times may vary by manufacture.)

* The optimum rate of turn is 180°/ minute: 3°/second, 30°/10 seconds, 45°/15 seconds, and 90°/30 seconds.

Maintenance

CAUTION: Do not disassemble the compass. Removing the screws from the compass (part A) will damage the waterproof seal, thus voiding the warranty.

CAUTION: Do not immerse in water or pressure wash. Doing so may allow water to infiltrate the sensor, voiding the warranty.

Since the sensor has no moving parts, it requires minimal maintenance. Clean the sensor with a soft damp cloth and mild household detergent.

Troubleshooting

Problems with the Sensor

- Is there power to the compass?
- Are all the connections tight?
- Is the cable-run free of kinks or damage?
- Is the compass wired correctly?
- Is there damage to the compass?
- Is the compass exposed to excessive vibration?

Problems with the Compass

- Is the compass installed facing forward and parallel to the centerline of the boat?
- Is the compass calibrated?
- Is there interference from ferrous metals, electronic equipment, electric motors, batteries, or cables that are creating a magnetic field?
- Is the compass mounted near the boat's center of gravity?

Problems with the Rate Gyro or Accelerometer

- Is the compass installed reasonably level with the waterline?
- Is the compass mounted near the center of the vessel's fore-aft axis?

NMEA 2000® Specification

LEN is the amount of current a devise draws from an NMEA 2000 network.
(1 LEN = 50 mA)

Load Equivalency Number (LEN).....3

Trademarks

Comnav® is a trademark of ComNav Marine Ltd.
Loctite® and 242® are trademarks of Henkel Corporation.
NMEA 2000® is a registered trademark of the National Marine Electronics Assoc.

Limited Warranty Agreement

Congratulations, you have purchased sophisticated and sensitive marine equipment (the “Equipment”) manufactured by ComNav Marine Ltd. of #15 - 13511 Crestwood Place, Richmond, British Columbia, Canada, V6V 2G1 (“ComNav”).

LIMITED ONE YEAR WARRANTY. ComNav warrants to the Purchaser, provided that the recommended installation and maintenance procedures set forth in the manual that has been provided with the Equipment (the “Manual”) have been followed, and subject always to the other provisions of this Agreement, that the Equipment is free from defects in workmanship and materials under normal use and service and will perform substantially in accordance with the specifications set forth in the Manual for a period of one (1) year from the date of purchase of the Equipment by the Purchaser.

EXTENDED THREE YEAR LIMITED WARRANTY. If:

(a) the Equipment is installed:
  (i) by an authorized ComNav Dealer; or
  (ii) by someone other than an authorized ComNav Dealer, and such installation has been inspected by an authorized ComNav Dealer; and

(b) the Limited Warranty Registration Card has been returned to ComNav within 14 days of the date of purchase of the Equipment by the Purchaser with Part 1 thereof having been completed by the Purchaser, and with the Extended Limited Warranty Card having been completed and signed by an authorized ComNav Dealer and returned to ComNav within 14 days of that inspection;

ComNav warrants to the Purchaser that the Equipment is free from defects in workmanship and materials under normal use and service and will perform substantially in accordance with the specifications set forth in the Manual for a period of three (3) years from the date of purchase of the Equipment, subject to the other provisions of this Agreement.

NO OTHER WARRANTIES. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, COMNAV DISCLAIMS ALL OTHER WARRANTIES AND CONDITIONS, EITHER EXPRESSED OR IMPLIED, STATUTORY OR OTHERWISE WITH RESPECT TO THE EQUIPMENT, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR THE ORDINARY PURPOSES FOR WHICH THE EQUIPMENT IS USED OR FITNESS FOR A PARTICULAR PURPOSE AND ANY OTHER OBLIGATIONS ON THE PART OF COMNAV, ITS EMPLOYEES, SUPPLIERS, AGENTS, OR REPRESENTATIVES.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT SHALL COMNAV, ITS EMPLOYEES, SUPPLIERS, OR REPRESENTATIVES BE LIABLE FOR ANY DAMAGES WHATSOEVER, INCLUDING WITHOUT LIMITATIONS DAMAGE FROM COLLISION WITH OTHER VESSELS OR OBJECT, INJURY TO ANY PERSON OR PERSONS, DAMAGE TO PROPERTY, LOSS OF INCOME OR PROFIT, BUSINESS INTERRUPTION, OR ANY OTHER CONSEQUENTIAL, INCIDENTAL, RESULTING PUNITIVE, OR SPECIAL DAMAGES ARISING OUT OF THE USE OF OR INABILITY TO USE THE EQUIPMENT, INCLUDING THE POSSIBLE FAILURE OR MALFUNCTION OF, OR DEFECTS IN THE

EQUIPMENT, OR ANY PART THEREOF, EVEN IF COMNAV HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SOME STATE/ JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF CONSEQUENTIAL OR INCIDENTAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO THE PURCHASER.

REMEDIES NOT TRANSFERABLE. The Purchaser's remedies under this Agreement only apply to the original end-user of the ComNav Equipment, being the Purchaser, and only apply to the original installation of the Equipment. The Purchaser's remedies under this Agreement are not transferable or assignable by the Purchaser to others in whole or in part.

NOTICE OF DEFECTS. The Limited Warranty and the Extended Warranty will not apply with respect to any defective Equipment unless written notice of such defect is given to ComNav, by mail to the address for ComNav set forth above, or by facsimile to ComNav at 1-604-207-8008, and is received by ComNav within 10 days of the date upon which the defect first became known to the Purchaser. Notices sent by mail will be deemed to be received by ComNav on the seventh (7th) day first following the date of posting in North America and on the tenth (10th) day next following the date of posting anywhere else in the world. Notices sent by facsimile will be deemed to be received by ComNav on the date of transmission with appropriate answerback confirmation.

WARRANTY LIMITATIONS. Reversing Pumps & Motors, Hydraulic Linear Actuators, Watch Alarms & Motor Control Boxes which may comprise part of the Equipment are warranted by ComNav for a period of two (2) years under the Extended Limited Warranty described above. All Remote Controls, Remote Cables, Jog Switches, Analog meters (rudder angle indicators), Rudder Angle Indicator Systems & Accessories, Magnetic Compasses & Accessories, Constant Running Pumps, Engine Driven Pumps, Hydraulic Manifolds & Hydraulic Steering are warranted by ComNav for a period of one (1) year under the Limited Warranty described above.

I**MPLIED WARRANTIES**. Any implied warranties with respect to the Equipment are limited to one (1) year. Some states/jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to the Purchaser.

CUSTOMER REMEDIES. ComNav's entire liability and the Purchaser's exclusive remedy against ComNav for the defective Equipment shall be, at ComNav's option, either: (a) repair or replacement of the defective Equipment under the warranties set forth in this Agreement, or, (b) refund of the purchase price of the defective Equipment, all pursuant to and in accordance with the conditions set forth below:

1. If the Equipment, or any part thereof, proves to be defective within the relevant warranty period, the Purchaser shall do the following:
   (a) contact ComNav by phone 1-604-207-1600 to discuss the nature of the problem and obtain shipping instructions (many times a satisfactory solution can be reached without returning the item); and
   (b) prepare a detailed written statement of the nature of the circumstances of the defect, to the best of the Purchaser's knowledge, including the date of

purchase of the Equipment, the place of purchase, the name and address of the installer, and the Purchaser's name, address and telephone number to be sent, along with proof of purchase, to ComNav;

2. If upon examination by either ComNav or an authorized ComNav Dealer, the defect is determined to result from defective workmanship or material and if the defect has occurred within the relevant warranty period set forth above, the Equipment or the defective parts thereof shall be repaired or replaced, at ComNav's sole option, without charge, and shall be returned to the Purchaser at ComNav's expense. Return delivery will be by the most economical means. Should the Purchaser require that the Equipment be returned by a faster method, the costs incurred by the expedient delivery will be pre-paid by the Purchaser;
3. No refund of the purchase price for the Equipment will be made to the Purchaser unless ComNav is unable to remedy the defect after having a reasonable number of opportunities to do so. Prior to the refund of the purchase price, the Purchaser must submit a statement in writing from an Authorized ComNav Dealer that the installation instruction is the manual have been complied with in full and that the defect remains.
4. Warranty service shall be performed only by ComNav or an Authorized ComNav Dealer. Any attempts to remedy the defect by anyone else shall render the warranties set forth in this Agreement void;
5. Charges for overtime, standby, holiday and per diem will not be paid by ComNav and are specifically excluded from the warranties set forth in this Agreement. ComNav may, under special circumstances, and with ComNav's PRIOR approval, pay ONE TIME travel costs. Any cost of ferry, boat hire, or other special means of transportation must have prior approval from ComNav. ComNav reserves the right to refuse service charges in excess of one hour if the technician has not contacted ComNav's service department for assistance. Travel cost allowance to service certain Equipment with a suggested retail price of below $2,500.00 (Canadian funds or equivalent) is not authorized. If repairs are necessary, these products must be forwarded to ComNav or an authorized ComNav Dealer at Purchaser's expenses and will be returned as set out in **CUSTOMER REMEDIES**, Item 2;
6. There shall be no warranty for defects in, or damages to, the Equipment caused by:
   (a) faulty installation or hook-up of the Equipment;
   (b) abuse, misuse or use of the Equipment in violation of the instructions set forth in the Manual;
   (c) shipping, alterations, incorrect and/or unauthorized service;
   (d) accident, exposure of the Equipment to excessive hear, fire, lightning, salt or fresh water spray, or water immersion except for Equipment specifically designed as, and stated in the Manual to be, waterproof. Water damage tot he Equipment due to failure to cover unused receptacles is specifically excluded from any warranty set forth in this Agreement; and
   (e) improper or inadequate ancillary or connected equipment;
7. This warranty does not cover routine system checkouts, alignment, or calibration unless the service has been authorized in writing by ComNav PRIOR to its commencement; and

8. No Equipment shall be repaired or replaced under warranty of the serial number of that Equipment has been removed, altered or mutilated.

CHOICE OF LAW AND JURISDICTION. This Agreement is governed by the laws of the Province of British Columbia, Canada. If you acquired the Equipment outside of Canada, each of the parties hereto irrevocably adjourn to the jurisdiction of the courts of the Province of British Columbia, Canada and further agree to settle any dispute, controversy or claim arising out of or relating to this Limited Warranty, or the breach, termination, or invalidity of it, by arbitration under the rules of the British Columbia International Commercial Arbitration Center ("BCICAC"). The appointing authority shall be BCICAC [or, if the BCICAC shall cease to exist, the Chief Justice of the Supreme Court of British Columbia.] BCICAC shall administer the case in accordance with BCICAC Rules. There shall be one arbitrator and the place of arbitration shall be Vancouver, British Columbia.

The United Nations Convention of Contracts for the International Sale of Goods, Act. S.B.C. 1990 c.20, and any other statutory enactments of the United Nations Convention on Contracts for the International Sales of Goods do not apply to this Agreement.

THIS LIMITED WARRANTY GIVES THE PURCHASER SPECIFIC LEGAL RIGHTS. THE PURCHASER MAY ALSO HAVE OTHERS WHICH VARY FROM STATE/JURISDICTION TO STATE/JURISDICTION.

This Agreement is a legal contract between you (the "Purchaser") and ComNav. By retaining the Equipment for more than thirty (30) days and /or installing and /or using the Equipment, the Purchaser agrees to be bound by the terms of this Agreement. If the Purchaser does not agree to be bound by the terms of this Agreement, the Purchaser may return the Equipment in the same condition in which it was received for a full refund (less shipping and handling costs) within thirty (30) days of purchase.

WARNING. The Equipment is an aid to navigation only. It is not intended or designed to replace the person on watch. A qualified person should always be in a position to monitor the vessel's heading., watch for navigational hazards and should be prepared to revert to manual steering immediately if an undesired change of heading occurs, it the heading is not maintained within reasonable limits, or when navigating in a hazardous situation.

ALWAYS REMEMBER;

WHENEVER UNDER WAY, A QUALIFIED PERSON ON WATCH IS REQUIRED BY LAW.


ComNav®