V102 GPS Compass
Quick Reference Guide
Part No. 875-0277-000 Rev C1

Hemisphere GPS®

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6,549,091	6,631,916	6,711,501	6,744,404	6,865,465
6,876,920	7,142,956	7,162,348	7,277,792	7,292,185
7,292,186	7,373,231	7,400,956	7,400,294	7,388,539
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Contents

Overview

This quick reference guide provides information to get you up and running quickly with your V102 GPS Compass. For more detailed information on using the V102 refer to the V102 GPS Compass User Guide available at www.hemispheregps.com.

This guide consists of the following sections:

- "Parts List" below describes the parts in your V102 GPS Compass kit
- "Additional Documentation" below provides a link to additional V102 documentation
- "Installation Considerations" on page 2 contains recommendations for where to place your V102, dimensions of the unit, VHF interference, and mounting options
- "Mounting Orientation" on page 4 describes parallel and perpendicular orientations
- "Alignment" on page 5 describes how to align the V102
- "Connecting the V102 to External Devices" on page 6 provides information on the included power/data cable and how to connect to serial ports
- "Configuration" on page 8 lists basic configuration information
- "Supplemental Sensors" on page 8 describes the purpose of and calibration procedures for the sensors
- "Common Commands and Messages" on page 9 lists commands and messages common to V102 (for more information on commands and messages see the GPS Technical Reference at www.hemispheregps.com)

Parts List

In addition to this Quick Reference Guide (which is included in the V102 kit), installing the V102 GPS Compass requires the following:

- V102 GPS Compass, PN 804-075-000#

- (Accessory item) Power/data cable kit, PN 880-1036-000
  Kit includes power/data cable (15 m), clamp, screw, and washer

Cable

Clamp and screw
(washer not shown)

Additional Documentation

For more in-depth information on the V102 GPS Compass you can download the V102 User Guide from the Hemisphere GPS website at www.hemispheregps.com.

Installation Considerations

Refer to the V102 GPS Compass User Guide for more detailed installation instructions.

Location

Proper location is important to obtain a high-precision GPS reading. Choose an installation location using either the pole or fixed mount where the V102:

- Has a clear view of the sky
- Is away from other electronics and antennas
- Has enough cable to reach a power source
- Is on a level plane

Dimensions

The following drawing illustrates the physical dimensions of the V102.

157.89 mm (6.21″)

68.90 mm (2.71″)

SET SCREW
3/8-16 THREAD SIZE
2 PLACES

MOUNTING HOLE
M8 THREAD SIZE
4 PLACES

46.99 mm (1.85″)

MOUNTING HOLE
1-14 UNS-2A THREAD SIZE

31.75 mm (1.25″)

414.39 mm (16.31″)
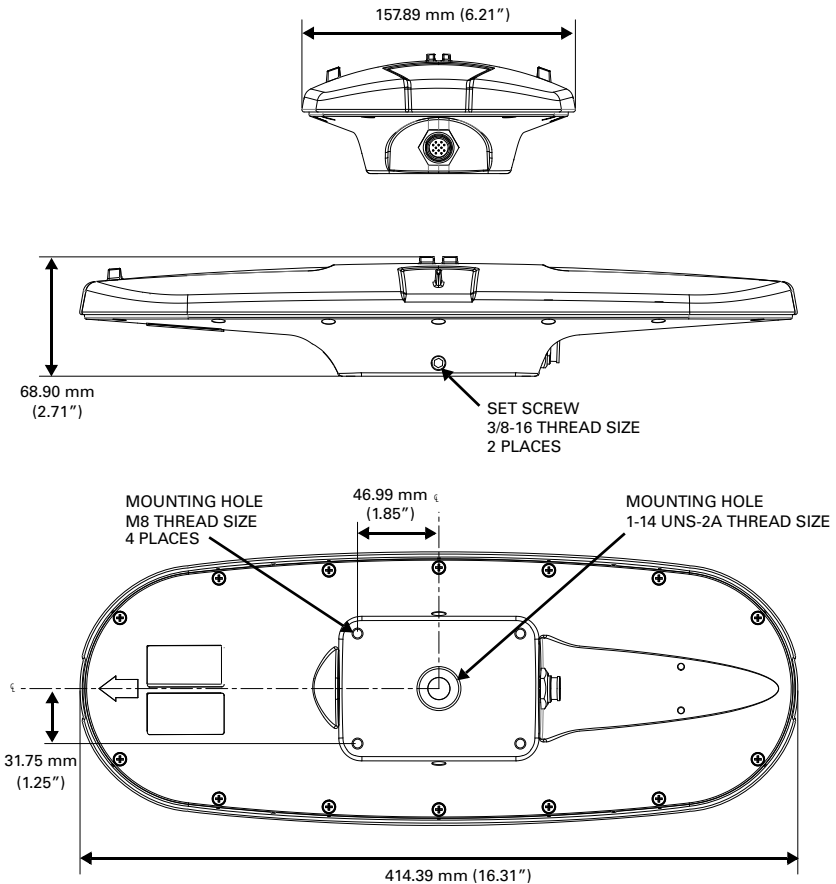
VHF Interference

VHF interference from such devices as cellular phones and radio transmitters may interfere with GPS operation. For example, if installing the MV102 near marine radios consider the following:

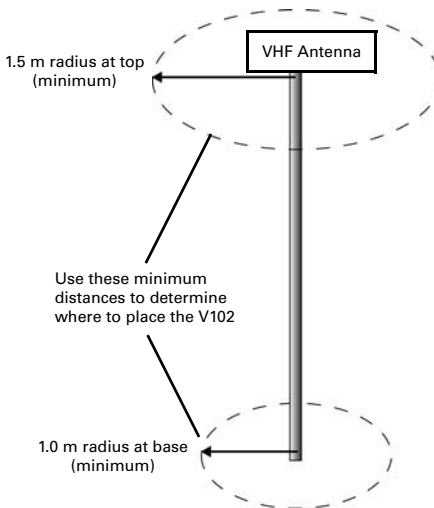- VHF marine radio working frequencies (Channels 1 to 28 and 84 to 88) range from 156.05 to 157.40 MHz. The L1 GPS working center frequency is 1575.42 MHz. The bandwidth is +/- 2MHz to +/- 10 MHz, which is dependent on the GPS antenna and receiver design.

- VHF marine radios emit strong harmonics. The 10th harmonic of VHF radio, in some channels, falls into the GPS working frequency band, which may cause the SNR of GPS to degrade significantly.

- The radiated harmonic signal strength of different brands/models varies.

- Follow VHF radio manufacturers' recommendations on how to mount their radios and what devices to keep a safe distance away.

- Handheld 5W VHF radios may not provide suitable filtering and may interfere with the V102's operation if too close.

Before installing the V102 use the following diagram to ensure there are no nearby devices that my cause VHF interference.

VHF Antenna

1.5 m radius at top (minimum)

Use these minimum distances to determine where to place the V102

1.0 m radius at base (minimum)

Mounting Options

*Hemisphere GPS does not provide the mounting hardware.

The V102 allows for two different mounting options: flush mount and pole mount.

- Flush mount - The bottom of the V102 contains four holes for flush mounting the unit to a flat surface (see "Dimensions" on page 2).

- Pole mount - The bottom of the V102 contains a mounting hole (1" thread, 0.9" depth) for easy pole mounting. Hand tighten (do not overtighten). The set screws on the long sides of the base (see middle drawing in "Dimensions" on page 2) allow you to secure the V102 in place (3/16" Allen wrench not included).

Mounting Orientation

The V102 outputs heading, pitch, and roll readings regardless of the orientation of the antennas. However, the relation of the antennas to the boat's axis determines whether you will need to enter a heading, pitch, or roll bias. The primary antenna is used for positioning and the primary and secondary antennas, working in conjunction, output heading, pitch, and roll values.

Parallel Orientation

(recommended orientation and resulting signs of HPR values)

Forward motion

Recessed arrow located on bottom of enclosure
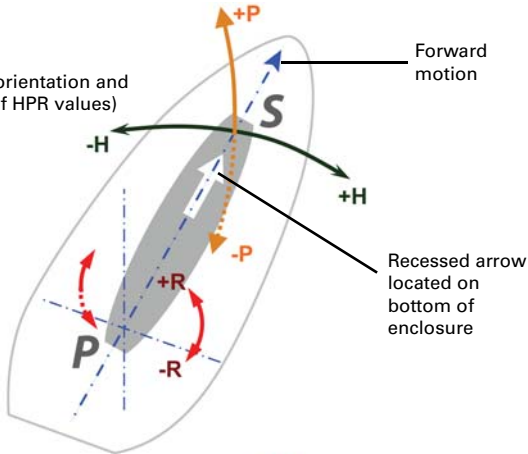
Perpendicular Orientation

(alternate orientation and resulting signs of HPR values)

Forward motion

Recessed arrow located on bottom of enclosure
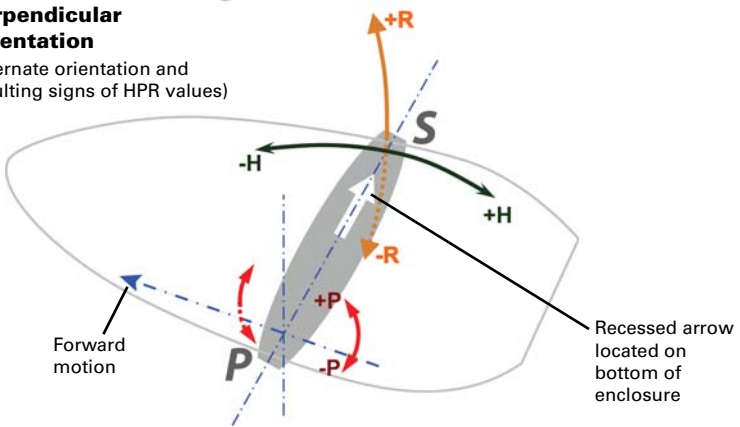
Alignment

The top of the V102 enclosure incorporates sight design features to help you align the enclosure with respect to an important feature on your vessel.

To use the sights, center the small post on the opposite side of the enclosure from you, within the channel made in the medallion located in the center of the enclosure top as shown in Figure 1-1 and Figure 1-2. Alignment accuracy when looking through the long site (Figure 1-1) is approximately +/- 1°, while alignment through the short site (Figure 1-2) is approximately +/- 2.5°.

Figure 1-1: Long site alignment
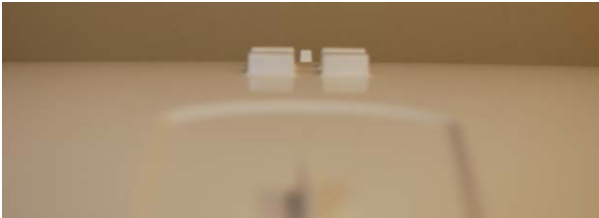
Figure 1-2: Short sight alignment

Connecting the V102 to External Devices

Power/Data Cable

The V102 uses a single 15 m (49 ft) cable for power and data input/output.
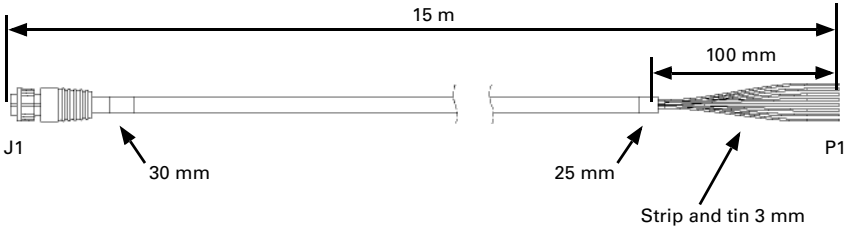
The receiver end of the cable is terminated with an environmentally sealed 12-pin connection; the opposite end is unterminated and requires field stripping and tinning.
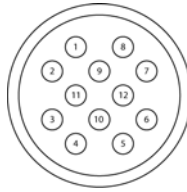
Table 1-1 shows the cable's pinout specifications.

Table 1-1: Power/data cable pinout

Pin	Function	Wire Color
1	Port C, RS-232 female DB9 pin 2, device out	White
2	Port C, RS-232 female DB9 pin 3, device in	Green
3	N/C	N/C
4	N/C	N/C
5	Power input	Red
6	N/C	N/C
7	Signal ground	Yellow
8	Port A, RS-232 female DB9 pin 3, device in	Brown
9	Port A, RS-232 female DB9 pin 2, device out	Blue
10	Power ground	Black
11	CH_GND	Drain
12	N/C	N/C

Serial Port Connection

The V102 offers position and heading data via two full-duplex (bi-directional) RS-232 serial ports. In addition to outputting data, these ports are used for firmware upgrades. You may configure Port A or Port C of the GPS receiver to output any combination of data that you want. Port A can have a different configuration from Port C in terms of data message output, data rates, and the baud rate of the port. This allows you to configure the ports independently based upon your needs. A personal computer (PC) typically uses a DB9-male connector for RS-232 serial port communications.

Note: For successful communications use the 8-N-1 protocol and set the baud rate of the V102's serial ports to match that of the devices to which they are connected. Flow control is not supported.

When interfacing to other devices, ensure the transmit data output from the V102 is connected to the data input of the other device. The signal grounds must also be connected.

Default Parameters

Table 1-2 and Table 1-3 provide details on the default port settings, available baud rates, differential age, elevation mask, and default differential mode. Use the $JSAVE command to save changes you make to the V102's configuration for the changes to be present in subsequent power cycles.

Table 1-2: Default port settings

Port	Baud Rate	NMEA Messages	Update Rate
Port A (RS-232)	19200	GPGGA, GPVTG, GPGSV, GPZDA, GPHDT, GPROT	1 Hz
Port C (RS-232)	19200	GPGGA, GPVTG, GPGSV, GPZDA, GPHDT, GPROT	1 Hz
Power RED (+), BLK (-)	6 - 36 VDC		
Note: The default update rate for NMEA 0183 messages is 1 Hz. 10 Hz is the standard maximum rate, but you can purchase a subscription to upgrade the output rate to 20 Hz.			

Table 1-3: Additional default settings

Parameter	Specification
Max DGPS age (correction age)	2700 seconds
Elevation mask	5°
Differential mode	SBAS (WAAS/EGNOS)

Configuration

Use a terminal program or PocketMax (available at www.hemispheregps.com) to connect to a serial port for additional configuration requirements. Use default baud rate of 19200 bps and 8-N-1 protocol.

- Change baud rate of either port to match that of the external equipment to which the V102 is connected. After changing the baud rate, you must close the terminal program and reconnect at the speed selected.
- Configure NMEA messages to be output on the appropriate port.
- Select differential source.
- Input heading bias (-180° to +180°) to compensate for any offset from the centerline.
- Input bias for tilt (-15° to +15°) to compensate for any offset from horizontal.
- Enable/disable supplementary sensors (default is GYROID and TILTAID on).
- Use the $JSAVE command to save the configuration changes when finished.

Supplemental Sensors

A pair of tilt sensors and a gyro are integrated in the V102. The user can turn either the tilt sensors or the gyro on or off. However, the system's performance is optimized with both the tilt sensors and the gyro on.

Table 1-4: Sensor descriptions and calibration procedures

Sensor	Purpose	Calibration Procedure
Gyro aid	Smooth rate of turn: Provides alternate source of heading for up to 3 min when GPS lock is lost Shortens heading reacquisition time	Will self-calibrate after several minutes To manually calibrate: 1. After heading is computed 2. Send $JATT,GYROAID,YES 3. Spin Vector for 1 min at less than 15°/sec 4. Leave unit stationary for 4 min **Note:** You do not need to recalibrate with standard use since the gyro selects the calibration.
Tilt aid	Smooths rate of heading Reduces startup and reacquisition times for obtaining heading	Precalibrated during manufacture To recalibrate: 1. Ensure Vector is level 2. Send $JATT,TILTCAL

Table 1-5: Sensor features

Feature	Normal Operation	Coasting (no GPS)
Heading	GPS	Gyro
Heave	GPS	None
Pitch	GPS	Inertial sensor
Roll	Inertial sensor	Inertial sensor

Common Commands and Messages

Note: When selecting your baud rate and message types, use the following calculation to determine your baud rate for your required data throughput.

Messages * Message output rate * Message length (bytes) * bits in byte
Ex: 5 * 20Hz * 40 bytes * 10 = 40,000 bits/sec

For information on message output rates refer to GPS Technical Reference available from the Hemisphere GPS website at www.hemispheregps.com.

Table 1-6: Commands

Command	Description
$JAGE	Specify maximum DGPS (COAST) correction age (6 to 8100 seconds)
$JAPP	Query or specify receiver application firmware
$JASC	Specify ASCII messages to output to specific ports
$JBAUD	Specify RS-232, RS-422 (output) communication rate
$JBIN	Specify binary messages to output to specific ports
$JDIFF	Query or specify differential correction mode
$JGEO	Query or specify SBAS for current location and SBAS satellites
$JI	Query unit's serial number and firmware versions
$JOFF	Turn off all data messages
$JQUERY,GUIDE	Query accuracy suitability for navigation
$JRESET	Reset unit's configuration to firmware defaults. **$JRESET clears all parameters.** See the V102 GPS Compass User Guide for more information.
$JSAVE	Save session's configuration changes

In Table 1-7 the Info Type value is one of the following: P = Position; V = Velocity, Time; H = Heading, Attitude; S = Sats, Stats, Quality

Table 1-7: NMEA 0183 and other messages

Message	Info Type	Description	IEC Approved Message
$GPDTM	P	Datum reference	Yes
$GPGGA	P	GPS position and fix data	Yes
$GPGLL	P	Geographic position - lat/long	Yes
$GPGNS	P	GNSS position and fix data	Yes
$GPGRS	S	GNSS range residual (RAIM)	Yes
$GPGSA	S	GNSS DOP and active satellites	Yes

**Table 1-7: NMEA 0183 and other messages (*continued)*

Message	Info Type	Description	IEC Approved Message
$GPGST	S	GNSS pseudo range error statistics and position accuracy	Yes
$GPGSV	S	GNSS satellites in view	Yes
*$GPHDG	H	Provides magnetic deviation and variation for calculating magnetic or true heading *see last bullet in Note at end of this table	Yes
*$GPHDM	H	Magnetic heading (based on GPS-derived heading and magnetic declination *see last bullet in Note at end of this table	No
*$GPHDT	H	GPS-derived true heading *see last bullet in Note at end of this table	Yes
$GPHEV	H	Heave value (in meters)	Yes
$GPRMC	P	Recommended minimum specific GNSS data	Yes
*$GPROT	H	GPS-derived rate of turn (ROT) *see last bullet in Note at end of this table	Yes
$GPRRE	S	Range residual and estimated position error	Yes
$GPVTG	V	COG and ground speed	Yes
$GPZDA	V	Time and date	Yes
$PASHR	H	Time, heading, roll, and pitch data in one message	No
$PSAT,GBS	S	Satellite fault detection (RAIM)	Yes
$PSAT,HPR	H	Proprietary NMEA message that provides heading, pitch, roll, and time in a single message	No
$PSAT,INTLT	H	Proprietary NMEA message that provides the pitch and roll measurements from the internal inclinometers (in degrees)	Yes
$RD1	S	SBAS diagnostic information	Yes
$TSS1	H	Heading, pitch, roll, and heave message in the commonly used TSS1 message format	No

Notes:

- The GP of the message is the talker ID.
- GPGRS, GPGSA, GPGST, and GPGSV support external integrity checking. They are to be synchronized with corresponding fix data (GPGGA or GPGNS).
- For information on outputting roll, pitch, and heave data in one message refer to the Hemisphere GPS Technical Reference available at www.hemispheregps.com.
- * You can change the message header for the HDG, HDM, HDT, and ROT messages to either GP or HE using the $JATT,NMEAHE command. For more information refer to the Hemisphere GPS Technical Reference available at www.hemispheregps.com.

Table 1-8: Binary messages

$JBIN Message	Description	$JBIN Message	Description
1	GPS position	95	Satellite ephemeris data
2	GPS DOPs	96	Code and carrier phase
80	SBAS	97	Processor statistics
93	SBAS ephemeris data	98	Satellites and almanac
94	Ionosphere and UTC conversion parameters	99	GPS diagnostics

Table 1-9: Parameters specific to $JATT command

Parameter	Description	Query	Specify
COGTAU	Set/query COG time constant (0.0 to 3600.0 s)	X	X
CSEP	Query antenna separation	X	
EXACT	Enable/disable internal filter reliance on the entered antenna separation	X	X
FLIPBRD	Turn the flip feature on/off	X	X
GYROAID	Enable/disable gyro	X	X
HBIAS	Set/query heading bias (-180.0° to 180.0°)	X	X
HELP	Show the available commands for GPS heading operation and status	X	
HIGHMP	Set/query the High Multipath setting for use in poor GPS environments	X	X
HRTAU	Set/query ROT time constant (0.0 to 3600.0 s)	X	X
HTAU	Set/query heading time constant (0.0 to 3600.0 s)	X	X
LEVEL	Query or enable/disable level operation	X	X
MSEP	Manually set or query antenna separation	X	X
NEGTILT	Query or enable/disable negative tilt	X	X
NMEAHE	Query for the message headers or change the HDG, HDM, HDT, and ROT message headers between GP and HE	X	X
PBIAS	Set/query pitch/roll bias (-15.0° to 15.0°)	X	X
PTAU	Set/query pitch time constant (0.0 to 3600.0 s)	X	X
ROLL	Query or configure for roll or pitch GPS orientation	X	X
SEARCH	Force a new GPS heading search		X
SPDTAU	Set/query speed time constant (0.0 to 3600.0 s)	X	X
SUMMARY	Display a summary of the current Crescent Vector settings	X	
TILTAID	Query or enable/disable accelerometer, pre-calibrated	X	X
TILTCAL	Calibrate accelerometers		X

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15. LIMITATION OF LIABILITY. IN NO EVENT WILL HEMISPHERE BE LIABLE TO LICENSEE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL OR INDIRECT DAMAGES INCLUDING ARISING IN RELATION TO ANY LOSS OF DATA, INCOME, REVENUE, GOODWILL OR ANTICIPATED SAVINGS EVEN IF HEMISPHERE HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH LOSS OR DAMAGE. FURTHER, IN NO EVENT WILL HEMISPHERE'S TOTAL CUMULATIVE LIABILITY HEREUNDER, FROM ALL CAUSES OF ACTION OF ANY KIND, EXCEED THE TOTAL AMOUNT PAID BY LICENSEE TO HEMISPHERE TO PURCHASE THE PRODUCT. THIS LIMITATION AND EXCLUSION APPLIES IRRESPECTIVE OF THE CAUSE OF ACTION, INCLUDING BUT NOT LIMITED TO BREACH OF CONTRACT, NEGLIGENCE, STRICT LIABILITY, TORT, BREACH OF WARRANTY, MISREPRESENTATION OR ANY OTHER LEGAL THEORY AND WILL SURVIVE A FUNDAMENTAL BREACH.

16. LIMITS ON LIMITATION OF LIABILITY. Some jurisdictions do not allow for the limitation or exclusion of liability for incidental or consequential damages, so the above limitation or exclusion may not apply to Licensee and Licensee may also have other legal rights which may vary from jurisdiction to jurisdiction.

17. BASIS OF BARGAIN. Licensee agrees and acknowledges that Hemisphere has set its prices and the parties have entered into this Agreement in reliance on the limited warranties, warranty disclaimers and limitations of liability set forth herein, that the same reflect an agreed-to allocation of risk between the parties (including the risk that a remedy may fail of its essential purpose and cause consequential loss), and that the same forms an essential basis of the bargain between the parties. Licensee agrees and acknowledges that Hemisphere would not have been able to sell the Product at the amount charged on an economic basis without such limitations.

18. PROPRIETARY RIGHTS INDEMNITY. Hemisphere shall indemnify, defend and hold harmless Licensee from and against any and all actions, claims, demands, proceedings, liabilities, direct damages, judgments, settlements, fines, penalties, costs and expenses, including royalties and attorneys' fees and related costs, in connection with or arising out of any actual infringement of any third party patent, copyright or other intellectual property right by the Software or by its use, in accordance with this Agreement and documentation, PROVIDED THAT: (a) Hemisphere has the right to assume full control over any action, claim, demand or proceeding, (b) Licensee shall promptly notify Hemisphere of any such action, claim, demand, or proceeding, and (c) Licensee shall give Hemisphere such reasonable assistance and tangible material as is reasonably available to Licensee for the defense of the action, claim, demand or proceeding. Licensee shall not settle or compromise any of same for which Hemisphere has agreed to assume responsibility without Hemisphere's prior written consent. Licensee may, at its sole cost and expense, retain separate counsel from the counsel utilized or retained by Hemisphere.

19. INFRINGEMENT. If use of the Software may be enjoined due to a claim of infringement by a third party then, at its sole discretion and expense, Hemisphere may do one of the following: (a) negotiate a license or other agreement so that the Product is no longer subject to such a potential claim, (b) modify the Product so that it becomes non-infringing, provided such modification can be accomplished without materially affecting the performance and functionality of the Product, (c) replace the Software, or the Product, with non-infringing software, or product, of equal or better performance and quality, or (d) if none of the foregoing can be done on a commercially reasonable basis, terminate this license and Licensee shall stop using the Product and Hemisphere shall refund the price paid by Licensee less an amount on account of amortization, calculated on a straight-line basis over a deemed useful life of three (3) years.

The foregoing sets out the entire liability of Hemisphere and the sole obligations of Hemisphere to Licensee in respect of any claim that the Software or its use infringes any third party rights.

20. INDEMNIFICATION. Except in relation to an infringement action, Licensee shall indemnify and hold Hemisphere harmless from any and all claims, damages, losses, liabilities, costs and expenses (including reasonable fees of lawyers and other professionals) arising out of or in connection with Licensee's use of the Product, whether direct or indirect, including without limiting the foregoing, loss of data, loss of profit or business interruption.

21. TERMINATION. Licensee may terminate this Agreement at any time without cause. Hemisphere may terminate this Agreement on 30 days notice to Licensee if Licensee fails to materially comply with each provision of this Agreement unless such default is cured within the 30 days. Any such termination by a party shall be in addition to and without prejudice to such rights and remedies as may be available, including injunction and other equitable remedies. Upon receipt by Licensee of written notice of termination from Hemisphere or termination by Licensee, Licensee shall at the end of any notice period (a) cease using the Software; and (b) return to Hemisphere (or destroy and provide a certificate of a Senior Officer attesting to such destruction) the Software and all related material and any magnetic or optical media provided to Licensee. The provisions of Sections 6), 7), 8), 9), 10), 15), 21), 26) and 27) herein shall survive the expiration or termination of this Agreement for any reason.

22. **EXPORT RESTRICTIONS**. Licensee agrees that Licensee will comply with all export control legislation of Canada, the United States, Australia and any other applicable country's laws and regulations, whether under the Arms Export Control Act, the International Traffic in Arms Regulations, the Export Administration Regulations, the regulations of the United States Departments of Commerce, State, and Treasury, or otherwise as well as the export control legislation of all other countries.

23. **PRODUCT COMPONENTS.** The Product may contain third party components. Those third party components may be subject to additional terms and conditions. Licensee is required to agree to those terms and conditions in order to use the Product.

24. **FORCE MAJEURE EVENT.** Neither party will have the right to claim damages as a result of the other's inability to perform or any delay in performance due to unforeseeable circumstances beyond its reasonable control, such as labor disputes, strikes, lockouts, war, riot, insurrection, epidemic, Internet virus attack, Internet failure, supplier failure, act of God, or governmental action not the fault of the non-performing party.

25. **FORUM FOR DISPUTES**. The parties agree that the courts located in Calgary, Alberta, Canada and the courts of appeal there from will have exclusive jurisdiction to resolve any disputes between Licensee and Hemisphere concerning this Agreement or Licensee's use or inability to use the Software and the parties hereby irrevocably agree to attorn to the jurisdiction of those courts. Notwithstanding the foregoing, either party may apply to any court of competent jurisdiction for injunctive relief.

26. **APPLICABLE LAW**. This Agreement shall be governed by the laws of the Province of Alberta, Canada, exclusive of any of its choice of law and conflicts of law jurisprudence.

27. **CISG.** The United Nations Convention on Contracts for the International Sale of Goods will not apply to this Agreement or any transaction hereunder.

28. **GENERAL.** This is the entire agreement between Licensee and Hemisphere relating to the Product and Licensee's use of the same, and supersedes all prior, collateral or contemporaneous oral or written representations, warranties or agreements regarding the same. No amendment to or modification of this Agreement will be binding unless in writing and signed by duly authorized representatives of the parties. Any and all terms and conditions set out in any correspondence between the parties or set out in a purchase order which are different from or in addition to the terms and conditions set forth herein, shall have no application and no written notice of same shall be required. In the event that one or more of the provisions of this Agreement is found to be illegal or unenforceable, this Agreement shall not be rendered inoperative but the remaining provisions shall continue in full force and effect.

Warranty Notice

COVERED PRODUCTS: This warranty covers all products manufactured by Hemisphere GPS and purchased by the end purchaser (the "Products"), unless otherwise specifically and expressly agreed in writing by Hemisphere GPS.

LIMITED WARRANTY: Hemisphere GPS warrants solely to the end purchaser of the Products, subject to the exclusions and procedures set forth below, that the Products sold to such end purchaser and its internal components shall be free, under normal use and maintenance, from defects in materials, and workmanship and will substantially conform to Hemisphere GPS's applicable specifications for the Product, for a period of 12 months from delivery of such Product to such end purchaser (the "Warranty Period"). Repairs and replacement components for the Products are warranted, subject to the exclusions and procedures set forth below, to be free, under normal use and maintenance, from defects in material and workmanship, and will substantially conform to Hemisphere GPS's applicable specifications for the Product, for 90 days from performance or delivery, or for the balance of the original Warranty Period, whichever is greater.

EXCLUSION OF ALL OTHER WARRANTIES. The LIMITED WARRANTY shall apply only if the Product is properly and correctly installed, configured, interfaced, maintained, stored, and operated in accordance with Hemisphere GPS's relevant User's Manual and Specifications, AND the Product is not modified or misused. The Product is provided "AS IS" and the implied warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE and ALL OTHER WARRANTIES, express, implied or arising by statute, by course of dealing or by trade usage, in connection with the design, sale, installation, service or use of any products or any component thereof, are EXCLUDED from this transaction and shall not apply to the Product. The LIMITED WARRANTY is IN LIEU OF any other warranty, express or implied, including but not limited to, any warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE, title, and non-infringement.

LIMITATION OF REMEDIES. The purchaser's EXCLUSIVE REMEDY against Hemisphere GPS shall be, at Hemisphere GPS's option, the repair or replacement of any defective Product or components thereof. The purchaser shall notify Hemisphere GPS or a Hemisphere GPS's approved service center immediately of any defect. Repairs shall be made through a Hemisphere GPS approved service center only. Repair, modification or service of Hemisphere GPS products by any party other than a Hemisphere GPS approved service center shall render this warranty null and void. The remedy in this paragraph shall only be applied in the event that the Product is properly and correctly installed, configured, interfaced, maintained, stored, and operated in accordance with Hemisphere GPS's relevant User's Manual and Specifications, AND the Product is not modified or misused. NO OTHER REMEDY (INCLUDING, BUT NOT LIMITED TO, SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL OR CONTINGENT DAMAGES FOR LOST PROFITS, LOST SALES, INJURY TO PERSON OR PROPERTY, OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL LOSS) SHALL BE AVAILABLE TO PURCHASER, even if Hemisphere GPS has been advised of the possibility of such damages. Without limiting the foregoing, Hemisphere GPS shall not be liable for any damages of any kind resulting from installation, use, quality, performance or accuracy of any Product.

HEMISPHERE IS NOT RESPONSIBLE FOR PURCHASER'S NEGLIGENCE OR UNAUTHORIZED USES OF THE PRODUCT. IN NO EVENT SHALL HEMISPHERE GPS BE IN ANY WAY RESPONSIBLE FOR ANY DAMAGES RESULTING FROM PURCHASER'S OWN NEGLIGENCE, OR FROM OPERATION OF THE PRODUCT IN ANY WAY OTHER THAN AS SPECIFIED IN HEMISPHERE GPS'S RELEVANT USER'S MANUAL AND SPECIFICATIONS. Hemisphere GPS is NOT RESPONSIBLE for defects or performance problems resulting from (1) misuse, abuse, improper installation, neglect of Product; (2) the utilization of the Product with hardware or software products, information, data, systems, interfaces or devices not made, supplied or specified by Hemisphere GPS; (3) the operation of the Product under any specification other than, or in addition to, the specifications set forth in Hemisphere GPS's relevant User's Manual and Specifications; (4) damage caused by accident or natural events, such as lightning (or other electrical discharge) or fresh/salt water immersion of Product; (5) damage occurring in transit; (6) normal wear and tear; or (7) the operation or failure of operation of any satellite-based positioning system or differential correction service; or the availability or performance of any satellite-based positioning signal or differential correction signal.

THE PURCHASER IS RESPONSIBLE FOR OPERATING THE VEHICLE SAFELY. The purchaser is solely responsible for the safe operation of the vehicle used in connection with the Product, and for maintaining proper system control settings. UNSAFE DRIVING OR SYSTEM CONTROL SETTINGS CAN RESULT IN PROPERTY DAMAGE, INJURY, OR DEATH. The purchaser is solely responsible for his/her safety and for the safety of others. The purchaser is solely responsible for maintaining control of the automated steering system at all times. THE PURCHASER IS SOLELY RESPONSIBLE FOR ENSURING THE PRODUCT IS PROPERLY AND CORRECTLY INSTALLED, CONFIGURED, INTERFACED, MAINTAINED, STORED, AND OPERATED IN ACCORDANCE WITH HEMISPHERE GPS'S RELEVANT USER'S MANUAL AND SPECIFICATIONS. Hemisphere GPS does not warrant or guarantee the positioning and navigation precision or accuracy obtained when using Products. Products are not intended for primary navigation or for use in safety of life applications. The potential accuracy of Products as stated in Hemisphere GPS literature and/or Product specifications serves to provide only an estimate of achievable accuracy based on performance specifications provided by the satellite service operator (i.e. US Department of Defense in the case of GPS) and differential correction service provider. Hemisphere GPS reserves the right to modify Products without any obligation to notify, supply or install any improvements or alterations to existing Products.

GOVERNING LAW. This agreement and any disputes relating to, concerning or based upon the Product shall be governed by and interpreted in accordance with the laws of the State of Arizona.

OBTAINING WARRANTY SERVICE. In order to obtain warranty service, the end purchaser must bring the Product to a Hemisphere GPS approved service center along with the end purchaser's proof of purchase. Hemisphere GPS does not warrant claims asserted after the end of the warranty period. For any questions regarding warranty service or to obtain information regarding the location of any of Hemisphere GPS approved service center, contact Hemisphere GPS at the following address:

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