IstarGPS Installation and Operations Manual

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To download this manual, Firmware updates and revision history please see the download page at http://www.istargps.com/

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Introduction

Congratulations on your choice of the IstarGPS Global Positioning System sensor. Your GPS is designed and constructed to meet the rigorous demands of marine and industrial environments. However, no machine can perform its intended function unless installed, operated and maintained properly. Please read this document carefully and follow the recommended procedures for installation, operation, and maintenance.

We would appreciate hearing from you about whether we are achieving our goal of delivering the highest quality and most connected GPS sensor on the market.

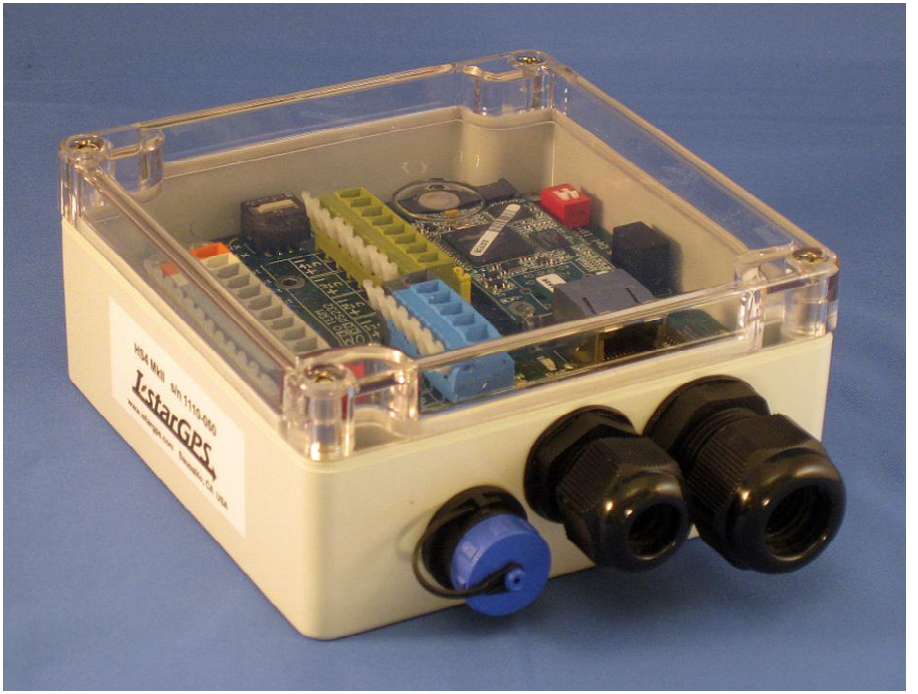

Figure 1 IstarGPS HS4

IstarGPS Overview

IstarGPS has been developed to address the needs of the marine, specifically for high performance vessels that require high speed sensors.

Recent advancements in GPS technology have greatly improved the Course Over Ground (COG) and Speed Over Ground (SOG) data by using Doppler of the GPS carrier wave signal. Using Doppler, the Cog/Sog data can be as fast to react as data generated from speed and heading transducers.

HS4 Product Features

- High speed Ublox6 GPS engine, up to 4Hz update rates and 115k baud.
- Four NMEA data outputs to drive twelve or more listeners (depending on listener load).
- NMEA outputs are completely independent, capable of varied sentences and baud rates.
- Ethernet 10/100 port, use a web browser interface for status and configuration.
- Four UDP channels for up to 40 ports.
- IP, UDP and NMEA ports.
- Precision barometer sensor outputting NMEA XDR sentence
- MOB functions with support for external contact closure
- Optional active antenna sharing enabling multiple GPS units to use a single antenna.
- 9 to 30vdc input voltage.

System Integration

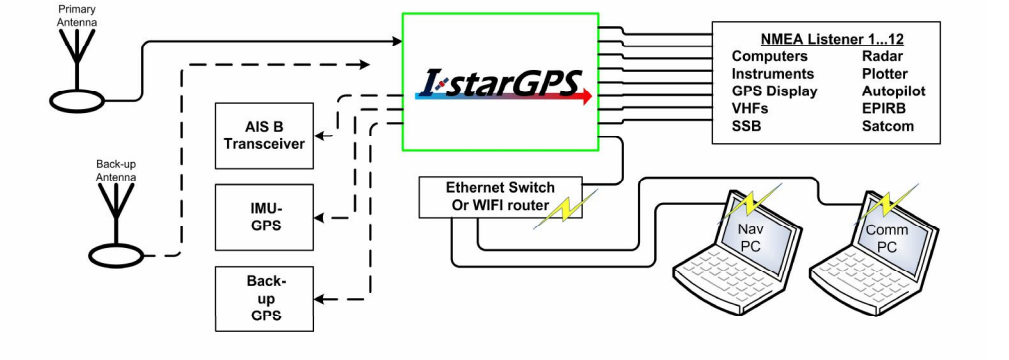

Figure 2 System Integration Drawing

Construction

The IstarGPS is a “black box” GPS sensor with no alphanumeric display. The primary user interface is via a computer and web browser. Alternatively, status information is available via LEDs on the main board. The enclosure is gray polycarbonate rated IP65 with IP68 water tight cable entries, one TNC and (optional) three SMA antenna connectors. One water tight cable entry is large enough to accommodate a RJ45 to pass through and still clamp to common CAT5 wire.

The antenna is a coax fed active element with 26db of gain. Several antenna styles are available (Appendix A).

SBAS (Satellite Based Augmentation Systems)

SBAS (Satellite Based Augmentation System) is an augmentation technology for GPS, which calculates GPS integrity and correction data with RIMS (Ranging and Integrity Monitoring Stations) on the ground and uses geostationary satellites (GEOs) to broadcast GPS integrity and correction data to GPS users. The correction data is transmitted on the GPS L1 frequency (1575.42 MHz), and therefore there is no additional receiver required to make use of the correction- and integrity data.

IstarGPS is delivered enabled to support several compatible SBAS systems available or in development worldwide:

- WAAS (Wide Area Augmentation System) for Northern America.
- EGNOS (European Geostationary Navigation Overlay Service) for Europe.
- MSAS (Multi-Functional Satellite Augmentation System) for Asia.
- GAGAN (GPS-aided geo-augmented navigation) for India.

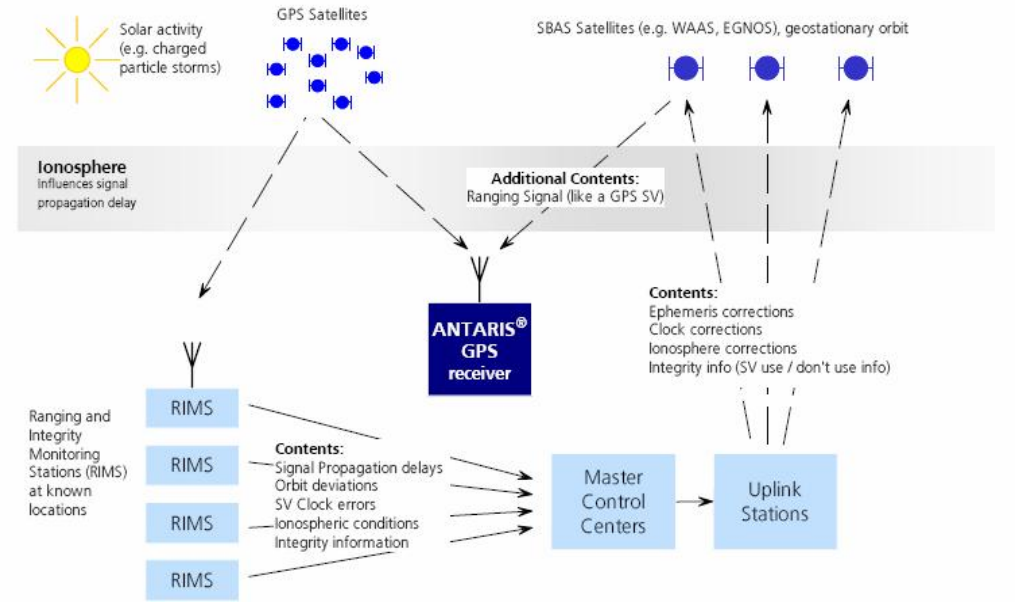

Figure 3 SBAS Flow Diagram

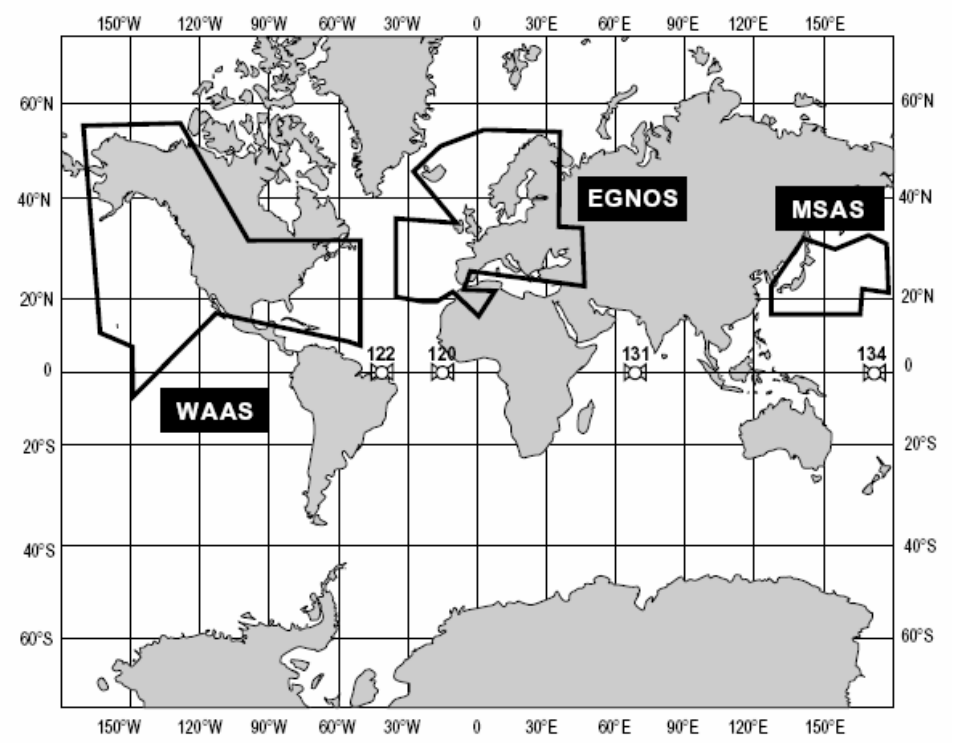

Figure 4 SBAS Coverage Areas

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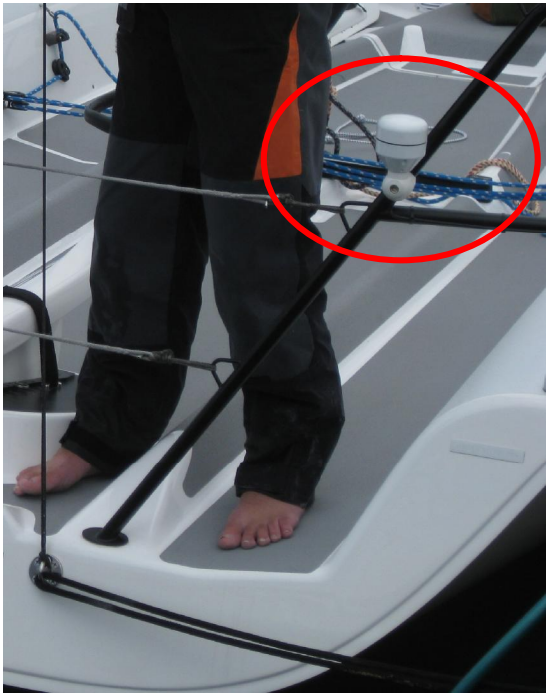
Installation

Mount the IstarGPS sensor (enclosure) in an environmentally protected non-corrosive area where cables can be safely routed into the enclosure. The preferred orientation for the enclosure is with the cable glands pointing down.

The antenna should be mounted in an area of the vessel that has a clear view of the sky with at least 1 meter separation from satellite communications antennas.

If mounting in the transom area, it is highly recommended to mount the antenna above the side decks of the vessel.



HS4 Motherboard Layout

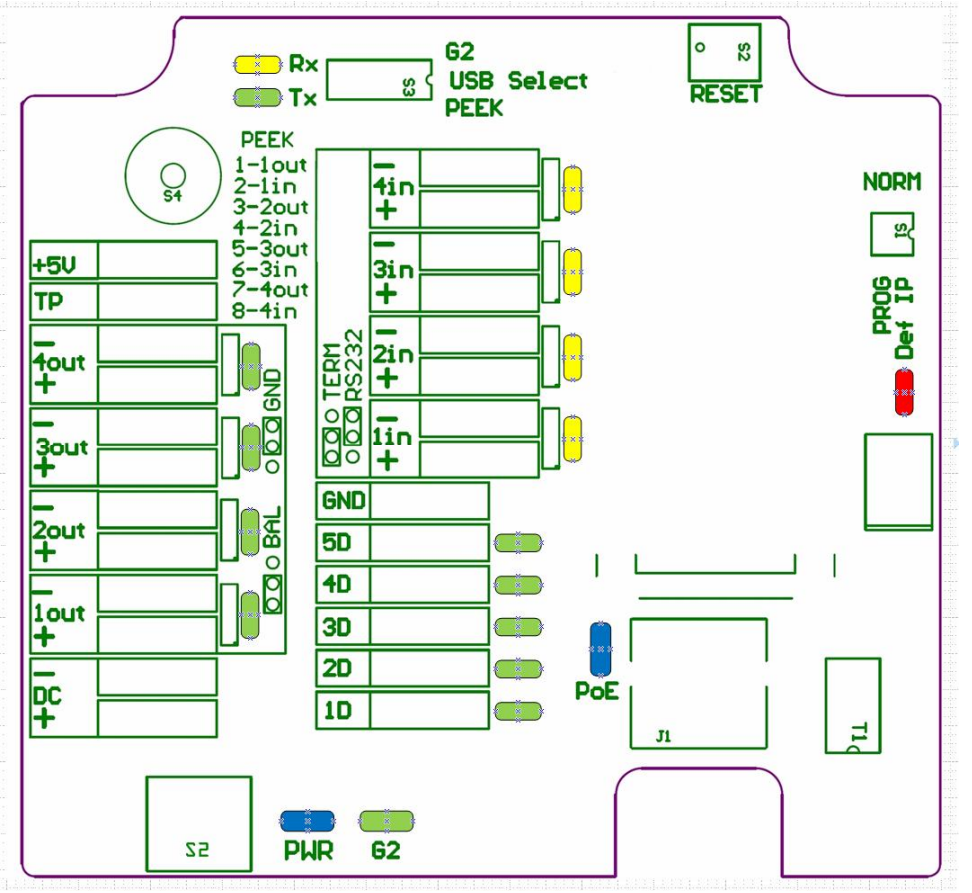


Figure 5

Power Input

Supply the system with **10 to 30v** DC on the terminals labeled Power + and Power -.

Also see Power over Ethernet, Appendix C.

A switch adjacent to the terminal strip (S2) toggles power on and off; a blue LED will illuminate when the internal power supplies are operating properly.

The IstarGPS incorporates resettable fuses. If there is an overload from reverse polarity or a hardware failure, the fuse will open circuit. Allow the fuse to cool for 30 seconds before applying power again.

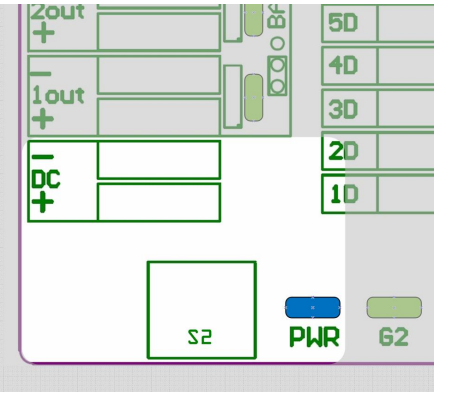


Figure 6 DC Power

Hardware Interfacing

Four independent NMEA 0183 data outputs are supplied on the cage clamp terminal strip. The terminal strip connectors can accommodate multiple conductors to the equivalent of 16 gauge wire.

NMEA 0183 data outputs are active within 8 seconds of powering the IstarGPS and the NMEA status LEDs will start flashing. GPS time and barometric pressure are typically valid within 30 seconds. Once the IstarGPS gains a position fix (less than 3 minutes from cold start), the position sentences will contain valid data.

NMEA Out ports default to 4800 baud, 8, n, 1 with GGA, GLL, RMC and enabled at 1Hz and VTG at 4hz.

Output port parameters can be configured for higher bauds to 115k and update rates to 4hz via the Browser interface – see section Operation.

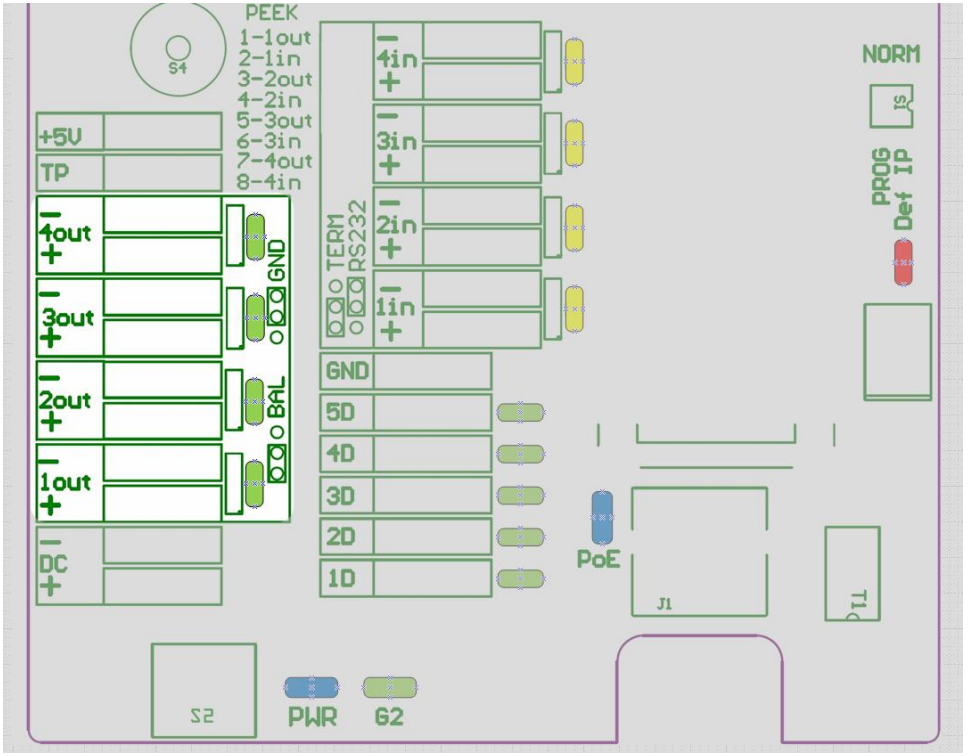


Figure 7 NMEA outputs and status LEDs

NMEA Output Electrical Selection

The IstarGPS NMEA outputs may be configured for two electrical methodologies, 1) balanced EIA-422 or 2) unbalanced "single ended" - also known as "data high referenced to ground".

The NMEA 0183 standard calls for Talkers to conform to EIA-422 (RS-422) which is a balanced circuit. However, many current production NMEA transmitters (Talker) use the single ended method, which is satisfactory due to opto isolators or similar circuits used in the receiving equipment (Listener). Figure 8 represents the output circuit and waveform of the single ended output configuration.

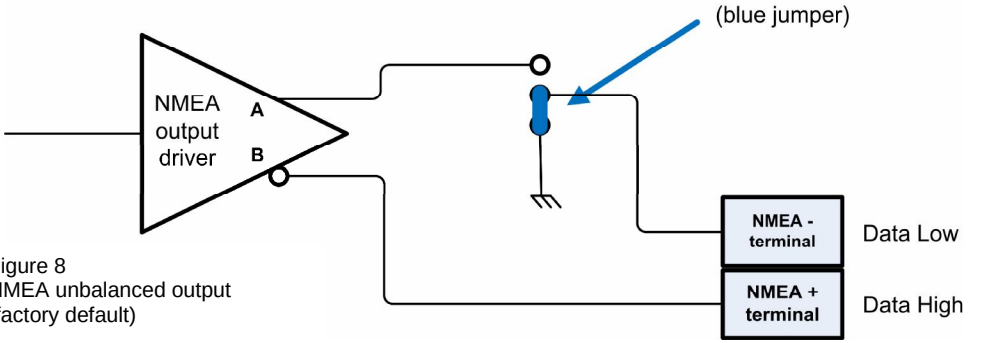


Figure 8
NMEA unbalanced output
(factory default)

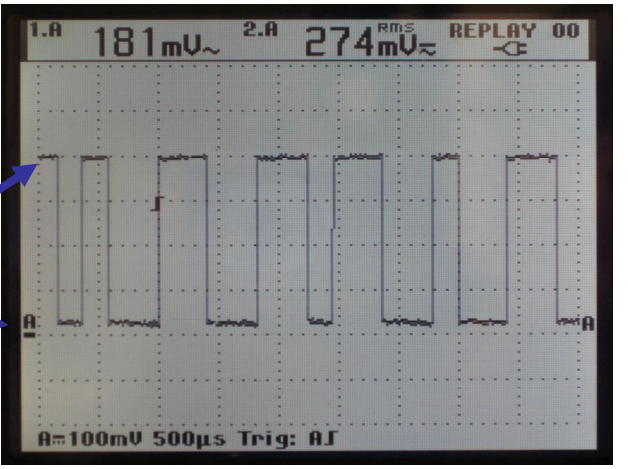


Figure 9
Unbalanced output
waveform (10:1 probe)

0v 4v

IstarGPS is shipped in the single ended configuration.

If a Listener requires receiving a balanced signal, if the data environment is very noisy or if the data is to be sent hundreds or thousands of feet, the balanced output can be selected by moving the appropriate jumper (J10).

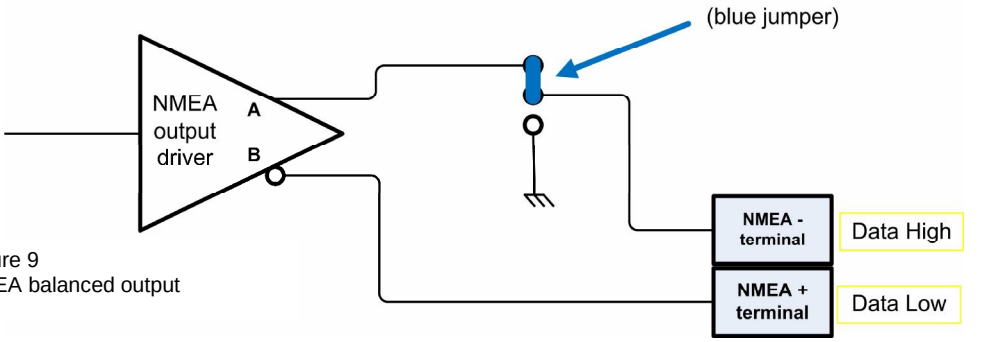
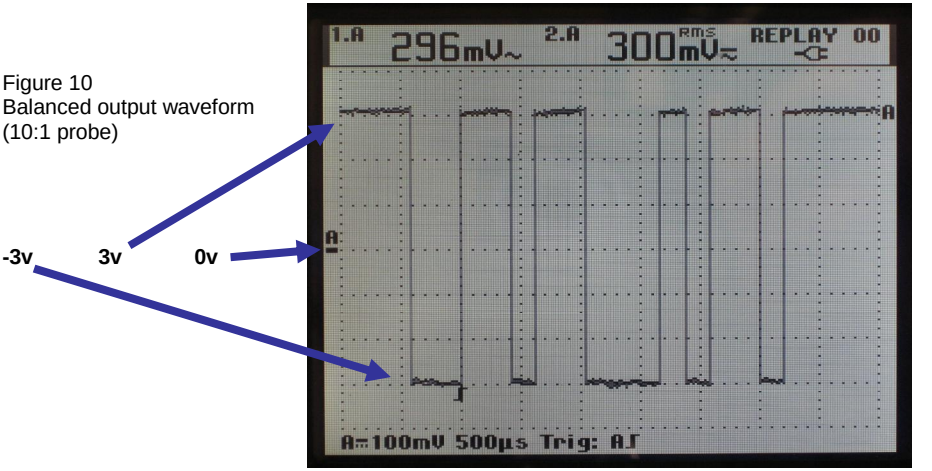


Figure 9
NMEA balanced output

NOTE! When Balanced is selected, the labels on the terminal strip are reversed! NMEA + becomes Data Low, NMEA – becomes Data High. There is no risk of damage if connected backwards but data may not flow.

Figure 10
Balanced output waveform
(10:1 probe)



Ethernet Connections

10baseT Ethernet is available via an RJ-45 connector for connection to the ships LAN or direct to a PC over standard Cat5 or Cat6 cable. The factory **default IP address is 192.168.1.152**.

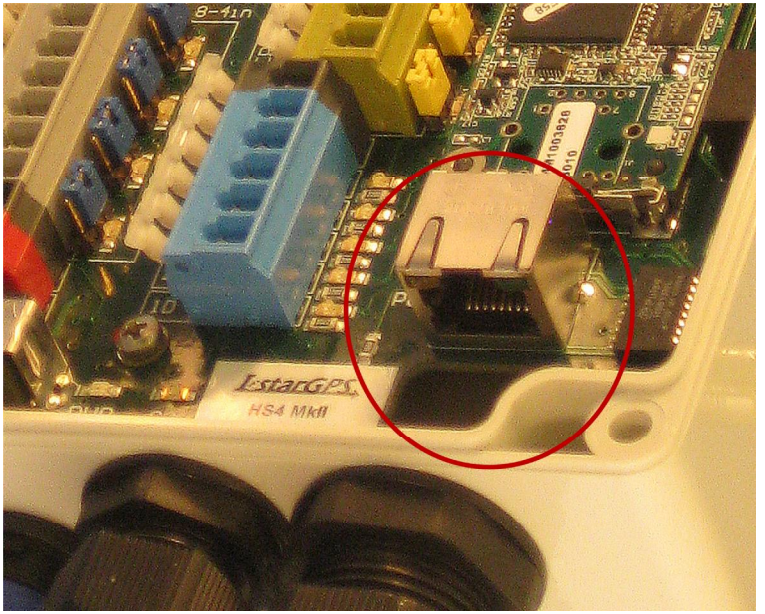
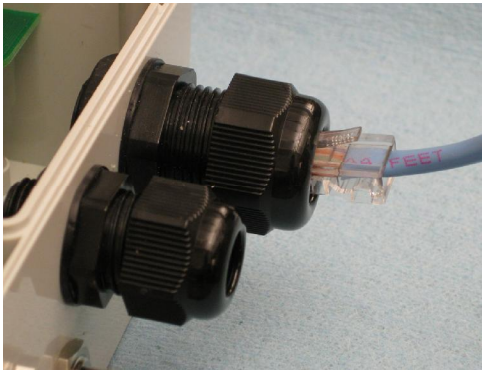


Figure 11 RJ45 Ethernet connection

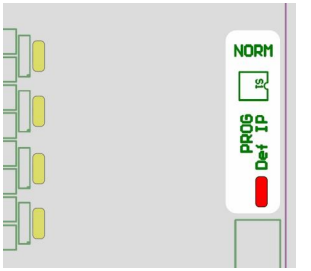
Figure 12

Large cable gland
for RJ45 connector



IP address and IP Reset Switch

The IP and subnet may be changed to suit the network LAN settings (see Set-up & Status page). The IstarGPS is shipped with a factory default IP address of 192.168.1.152 and subnet 255.255.255.0.



If communications over Ethernet is lost due to an incorrect IP address or subnet, a connection can always be re-established by invoking an IP reset via Switch 1 (S1).

Figure 13 IP Reset and Default IP LED

In the event the IP or subnet needs to be restored to the factory settings, do the following:

Figure 13a S1 Switch

1. "Close" the S1-1 rocker switch adjacent to the text "Def IP" by pressing down on the rocker.
2. Power cycle the IstarGPS
3. "Open" the S1-1 rocker switch by pressing down on the rocker.

The IstarGPS will now be at the factory default IP setting, IP 192.168.1.152, subnet 255.255.255.0.

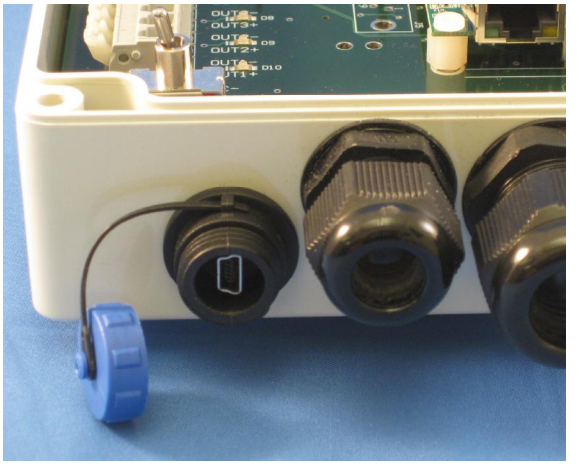
The IP Reset LED (red) will be on whenever factory IP settings are active (192.168.1.152 / 255.255.255.0)

USB Port for Data Monitoring and Flash Programming

The mini USB connector serves several functions depending on switch settings on the HS4 MkII board.

- Direct electrical monitoring of NMEA serial outputs and inputs
- Direct interface with core GPS engine
- Flash programming the system co-processor (see Flash Programming section)

Figure 14
USB connector

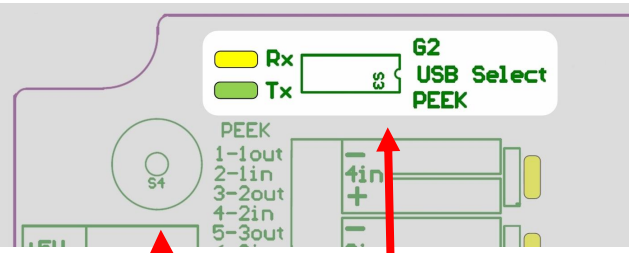


The function of the USB connector is controlled by S2 and S4 settings.

Selecting USB Port Function

The USB port selection switch (S3) internally directs USB to either 1) PEEK function – internal USB to serial converter to monitor serial (NMEA) data channels or 2) G2 - connect directly to the USB interface of the GPS core module.

Figure 15
USB port
selector S3



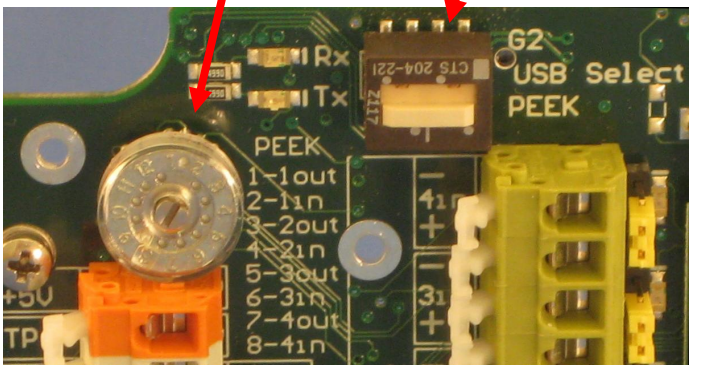


Figure 16 USB port selector S3 and Peek selector S4

PEEK (monitor) serial (NMEA) ports

Selecting “PEEK” on switch S3 electrically connects a FTDI USB to serial converter in parallel to a serial In or Out “+” terminal of the terminal strip. The output of the FTDI converter connects to the mini USB connector on the outside of the HS4 MkII.

Position the rotary switch S4 (figure 15, 16) in one of the eight positions to monitor the desired serial channel via the USB connection.

PEEK adds minimal load to the monitored serial line.

Monitoring Description:

Monitoring is typically done on a PC with a terminal program, such as HyperTerminal. The serial outputs of the HS4 MkII are set for

Baud rate = port setting in web page interface. See Configuring NMEA channels
Data bits = 8
Parity = none
Stop bit = 1
Flow Control = none

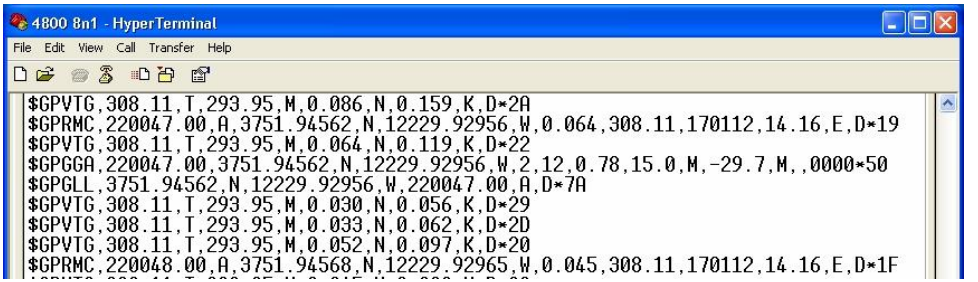


Figure 16a Example terminal capture

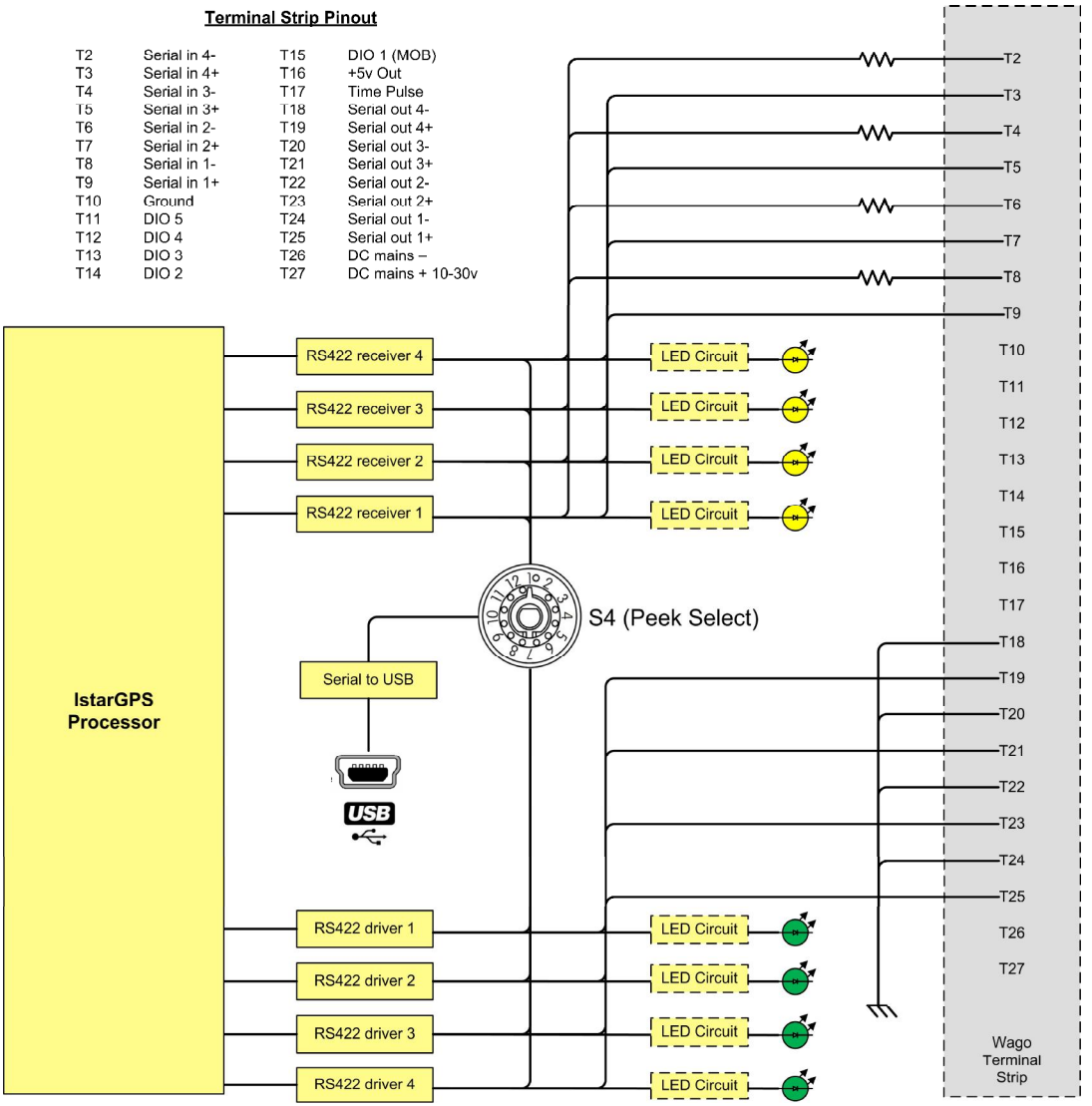


Figure 17 Serial to USB data output signal flow
(shown in unbalanced output, terminated input configuration)

Master Reset

Reset the IstarGPS to factory default settings by depressing and holding the “Master Reset” switch for 5 second while power is being applied.

NOTE: ALL USER ENTERED CONFIGURATION DATA WILL BE ERASED.

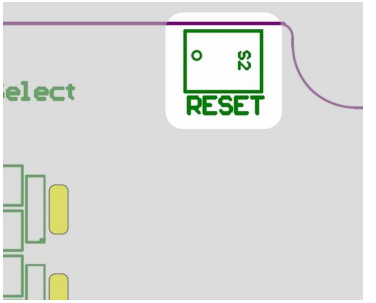


Figure 18
Master Reset

Man Overboard (MOB)

The Man Overboard feature utilizes Digital IO #1 (1D) connected between 1D and ground (GND) via a contact closure. The contact closure may be a momentary switch or relay.

The contact closure must be maintained for 3 seconds for the MOB function to be triggered.

Refer to the MOB function in the Operation section of this manual for details regarding the MOB user interface and data output.

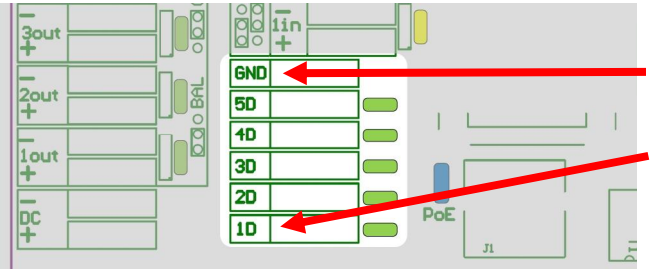


Figure 18a
MOB contact closure between 1D and GND

Serial Inputs and Digital IOs (future use)

The HS4 MkII has four serial data inputs and four digital IOs that are unassigned and avaialble for future use. Custom solutions include data multiplexing and acting as a serial to ethernet gateway.

The digital lines can act as an Input and accept a contact closure or as an Output to supply a 5v state change to an external device (drive a relay or trigger another device directly).

Please contact IstarGPS for further information. Potential uses:

- Serial data from an instrument system > interleve with GPS data > send to PoE capable radio to broadcast off the vehicle.
- Serial data sensor > gateway to Ethernet.
- Serial data from additional GPS sensors > multiplex and set priority of sensors. Broadcast to PC for logging of all sensors.
- Digital input (contact closure) for marking an event in log files.
- Digital output for triggering an alarm when a condition is met.

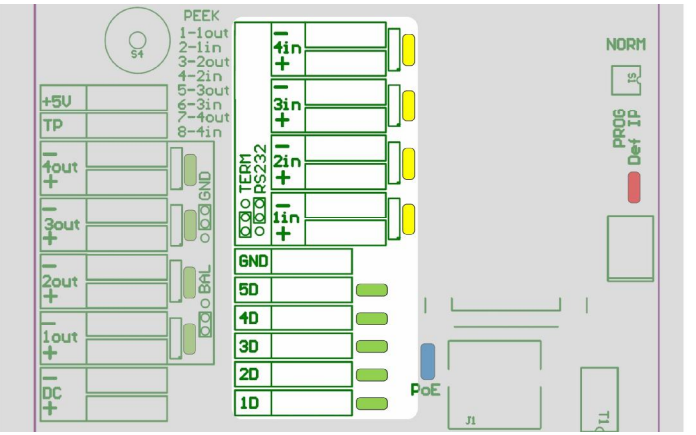


Figure 19 Digital I/Os and Serial Inputs

5 Volt Output

5 volts has been provided on the HS4 MkII board for powering sensors, lights or other devices that may require a regulated 5 volt supply. The 5 volt supply can supply 600ma of current and shares the same DC ground as the HS4 MkII.

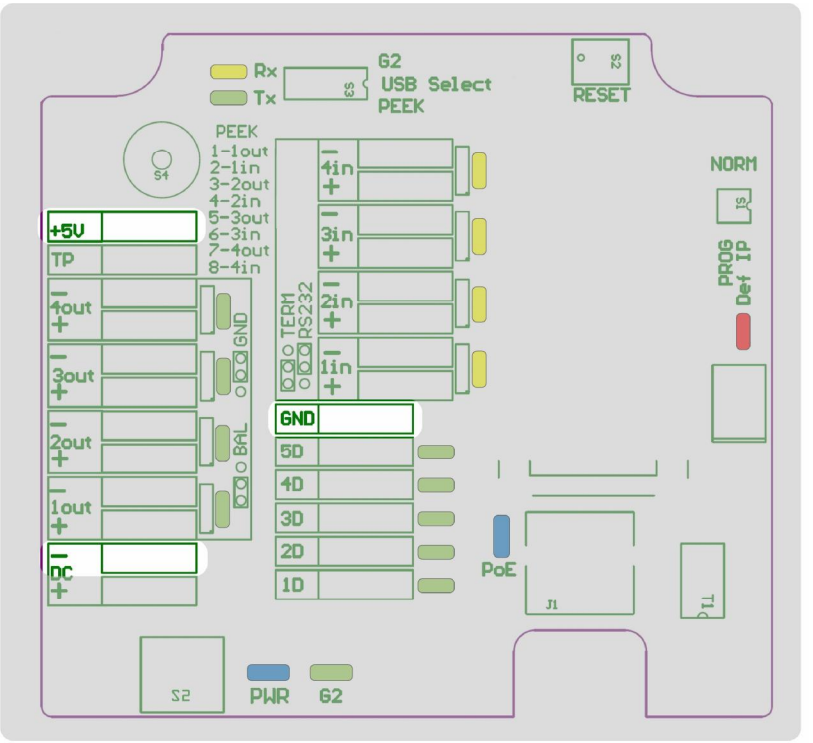


Figure 19a 5 Volt output and ground reference locations

Operation

Viewing the status and control options of the GPS require a computer, a common web browser (Internet Explorer, Firefox, Chrome etc.) and connecting the computer to the IstarGPS over Ethernet. **This requires the computer to be on the same IP block as the IstarGPS.**

Configuring the IstarGPS

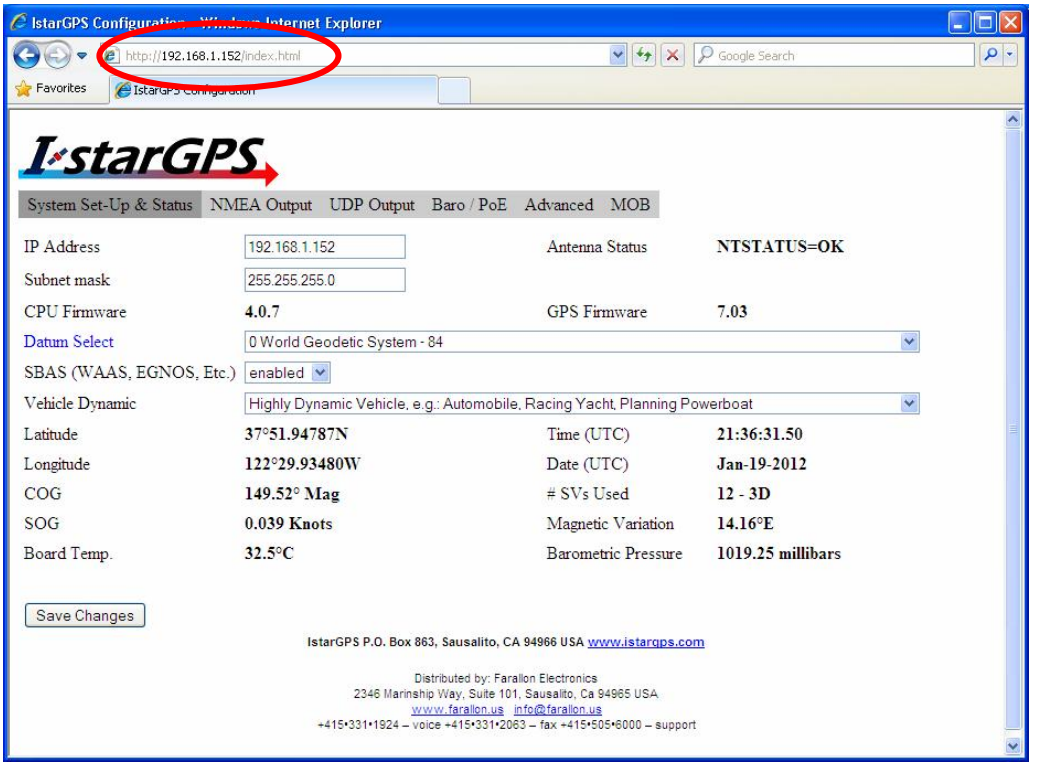


Figure 20 IstarGPS System Set-Up and Status Page

To view the home page for the first time, type the default IP address into the address bar of your browser – **192.168.1.152 - hit enter** (fig 20).

Changing the IP address and / or Subnet Mask

The IP address and Subnet may be edited to suit your LAN configuration. Edit the IP or Subnet fields on the System Set-Up & Status page, click "Save Changes"; this commits the change to memory.

New IP settings will take effect when power is cycled.

When IP settings are different than the factory defaults, the IP Reset LED will be extinguished.

Serial Input Control (future use)

The HS4 MkII incorporates four serial Inputs whose interface settings follow the corresponding Output (e.g. if Output 2 is configured for 4800/8n/1, Input 2 will be the same).

The serial inputs have not been implemented as of the writing of this manual. Contact IstarGPS if you have an application.

Watch this space
for added features

Figure 21 Setting Serial Inputs

Datum Selection

IstarGPS supports over 200 map datums. Selection is made on the System Set-Up & Status page (Fig. 21). Refer to Appendix D for the list of datums.

Select the desired datum with the drop down box, hit Save Changes button. The datum in use is shown as Current Datum. WGS84 is the default datum.

NOTE: external devices (such as PC applications) can apply their own datum offsets. THE EXTERNAL DEVICE MAY HAVE NO WAY OF KNOWING if it is receiving datum corrected data. If datum corrections are applied in the IstarGPS AND the external device, a **position error will result**.

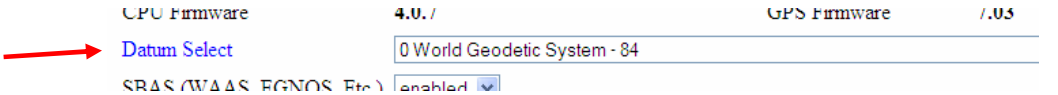


Figure 22 Setting Map Datum

SBAS Enable / Disable

The default setting has SBAS enabled. If for some reason SBAS is not functioning properly (e.g. system outage), the user may disable SBAS (WAAS, EGNOS, etc.) by selecting Disable in the SBAS dropdown box and clicking Save Changes.

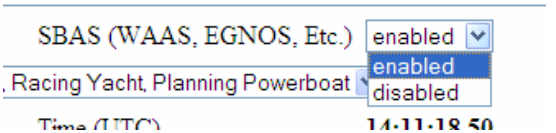


Figure 23 Enable / Disable SBAS

Vehicle Dynamic

The processing filters in the IstarGPS are adjustable. Depending on the platform the system is mounted to. Select from two selections, 1) Highly Dynamic and 2) Slower Moving.

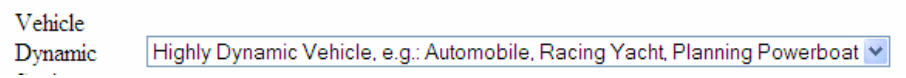


Figure 24 Vehicle Dynamic setting

Configuring the NMEA Channels

Each of the four NMEA channels has its own configuration page for setting Baud rate and output sentences.

Not fully implemented with v.4.xx firmware

Baud rates: 1200 to 115K
NMEA sentences:

- *DTM - Datum Reference (0.5hz)*
- *GBS - GNSS Satellite Fault Detection (0.5hz)*
- GGA - Global positioning system fix data (0.1 – 4hz)
- GLL - Geographic position - latitude/longitude (0.1 – 4hz)
- GSA - GNSS DOP and active satellites (0.1 – 4hz)
- GSV - GNSS satellites in view (0.1 – 4hz)
- RMC - Recommended minimum specific GNSS data (0.1 – 4hz)
- VTG - Course over ground and ground speed (0.1 – 4hz)
- *GRS - GNSS range residuals (0.1 – 4hz)*
- *GST - GNSS pseudo range error statistics (0.1 – 4hz)*
- *TXT – Text messages (0.5hz)*
- ZDA - Time and date (0.1 – 4hz)

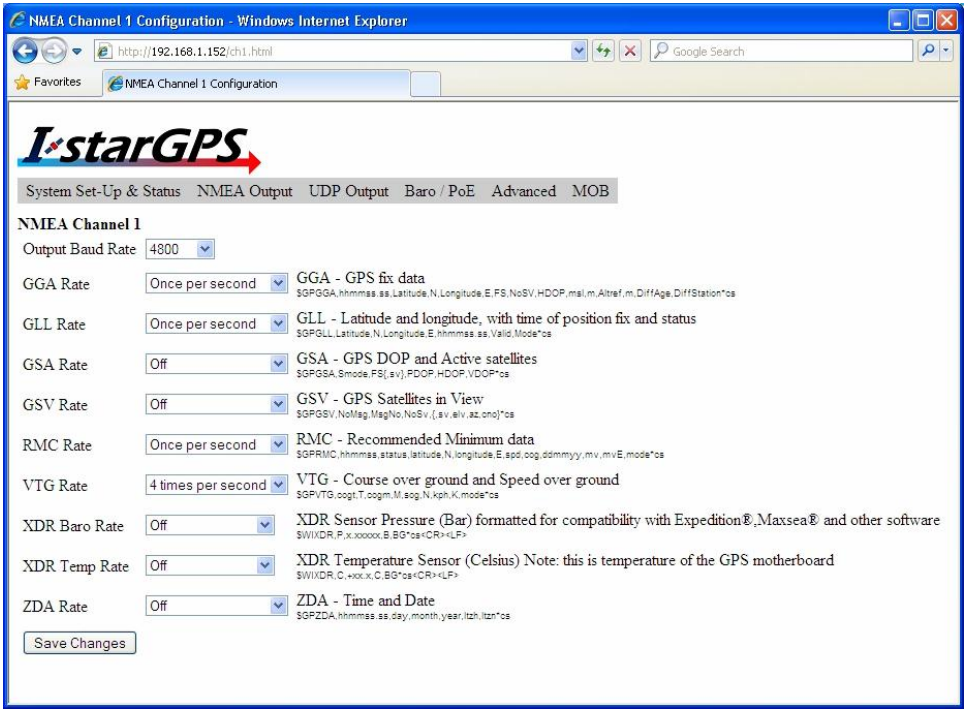


Figure 25 NMEA configuration page

To change Baud or the sentence output rate:

- Click the appropriate drop down box(es) and make your selection.
- Click “Save Changes”.
- You will be taken to the System Set-Up and Status page signifying your changes have been made.

All NMEA channels come from the factory at 4800 Baud with GGA, GLL, RMC enabled at 1hz (once per second) and VTG at 4hz (four times per second).

Error - Exceeding Channel Bandwidth

If the output selections exceed the amount of data capable of being sent at the selected Baud rate, you will receive an error message.

Correct this by: 1) INCREASE your Baud rate, 2) REDUCE sentence update rates or 3) turn off sentences.

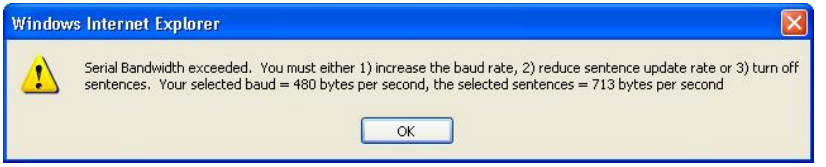


Figure 26 Bandwidth error message

UDP Broadcast

There are four configurable UDP channels. UDP transmits NMEA data via a TCP/IP port for compatible software applications to receive. This facility removes the need for traditional serial port connection to a PC.

Baud rate settings do not apply with UDP.

UDP Destination default = 192.168.1.255
UDP Port defaults Channel 1 through 4 = 4321, 4322, 4323, 4324

It is suggested that the port number not be changed unless it conflicts with other equipment.

Up to 10 UDP ports per channel may be entered separated by a comma (see fig. 27) for a maximum of 40 ports.

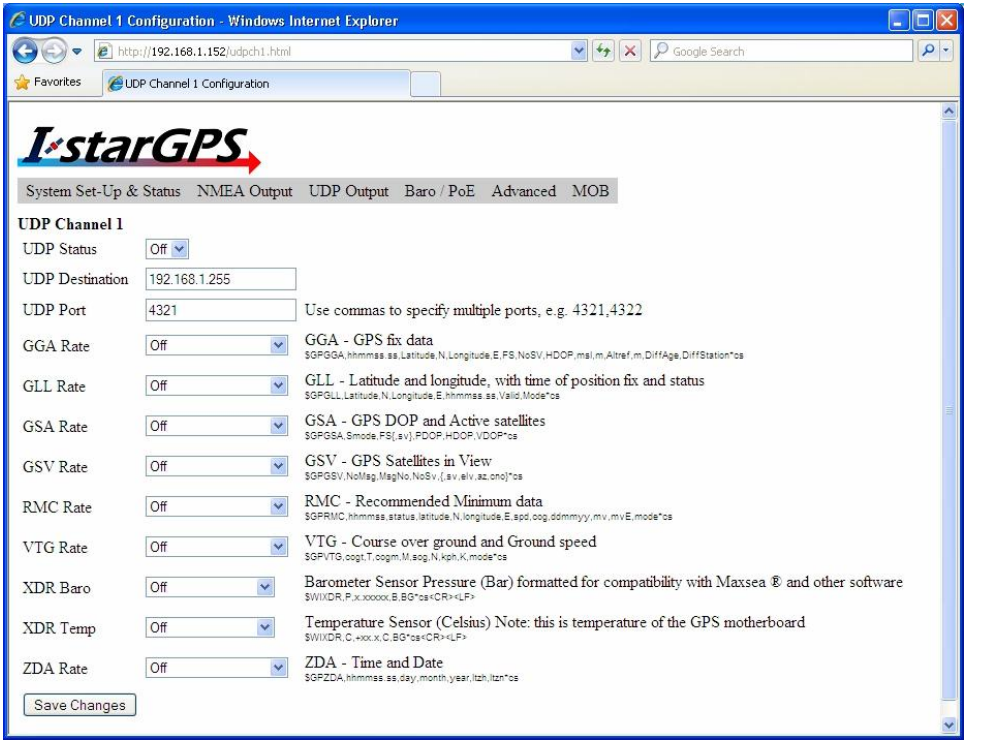


Figure 27 UDP Set-Up page

The high bandwidth of Ethernet allows for maximum sentence output rates. Sentences may be changed or deselected:

- Click the appropriate drop down box(es) and make your selection.
- Click “Save Changes”.
- You will be taken to the System Set-Up and Status page signifying your changes have been made.

Expedition UDP Reception

From the main menu bar select

- Instruments > Connections…
- Select a Network tab
- Enter the IstarGPS UDP port number

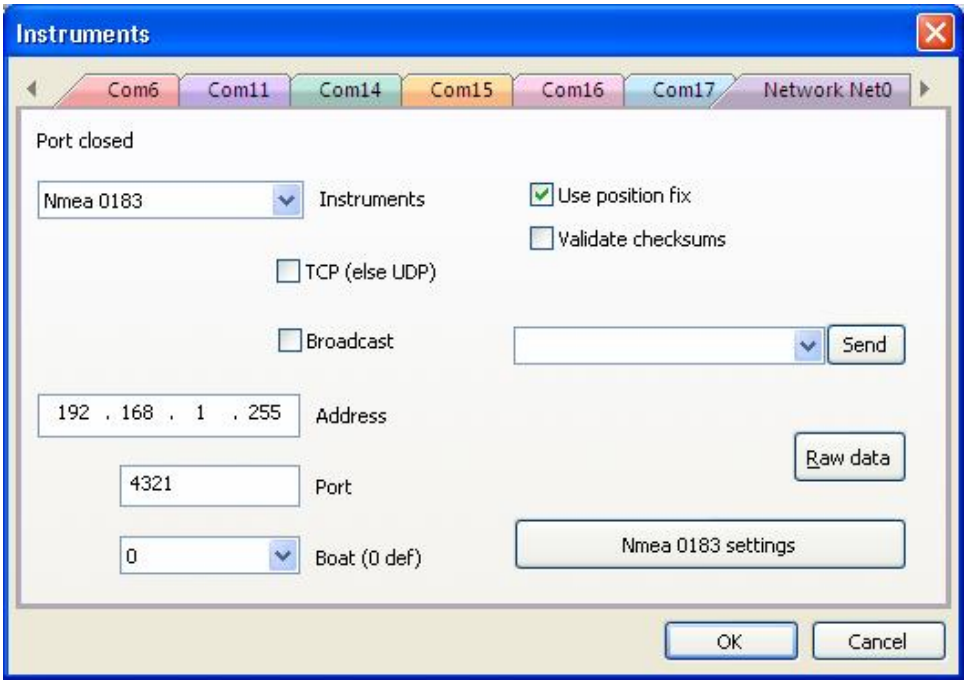


Figure 28 Expedition UDP Set-Up page

Airmail2000 UDP Reception

Consult the Airmail2000 help to enable the Position Reporting module.

- Check “Data input Enabled”
- Click “Setup…” button. New window will appear
- Check “GPS/NMEA Port Enabled”
- In the dropdown box where Com ports are shown, enter the IstarGPS UDP port number

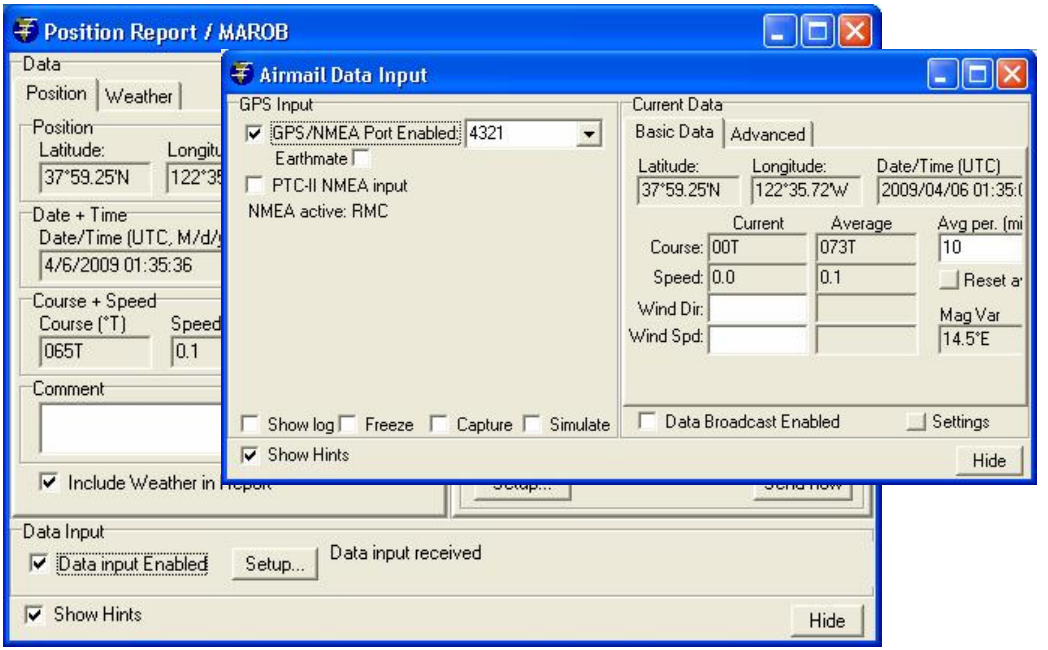


Figure 29 Airmail2000 UDP Set-Up pages

Barometer and Temperature

Measurement units are selected on this page. Selections **only affect the units displayed on IstarGPS browser pages.** Transmitted NMEA data is always formatted in Bar (pressure) and Celsius.

The temperature sensor is on the IstarGPS motherboard and is used to calibrate the barometer. Temperature will not represent atmospheric conditions.

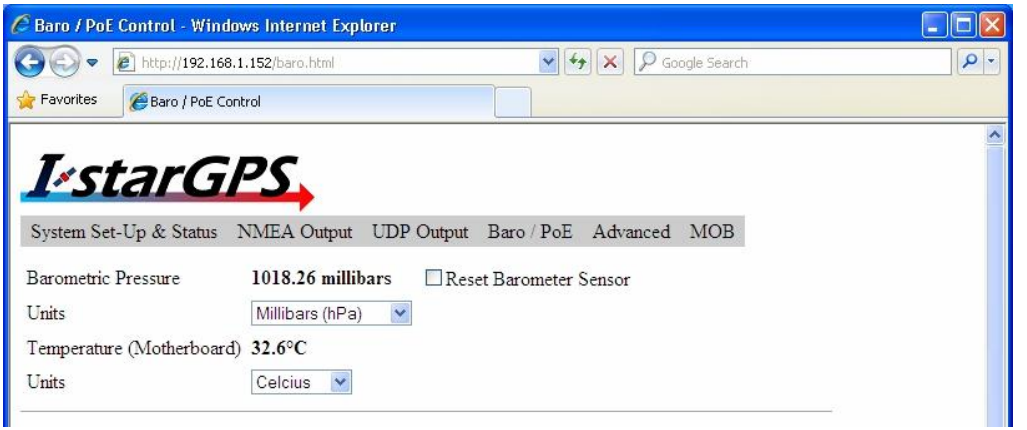


Figure 30 Barometer and Temperature page

Advanced

The Advanced tab works in conjunction with Ucenter software, which is further described in Appendix D. The purpose of the Advanced tab is to display and remember custom settings made to the GPS core module via Ucenter software that go beyond the settings offered on IstarGPS web pages. Ucenter software gives complete access to all possible settings within the GPS core.

Figure 31 Advanced Tab

Functions to be further described here…

Man Overboard

The Man Overboard (MOB) feature triggers a position to be saved in memory and relevant navigation data to be generated.

Triggering the MOB can be done in two ways:

1. Click the larger “Man Overboard” button on the IstarGPS MOB page
2. Use a remote contact closure wired between 1D and GND. The contact closure must be made for 3 seconds or more.

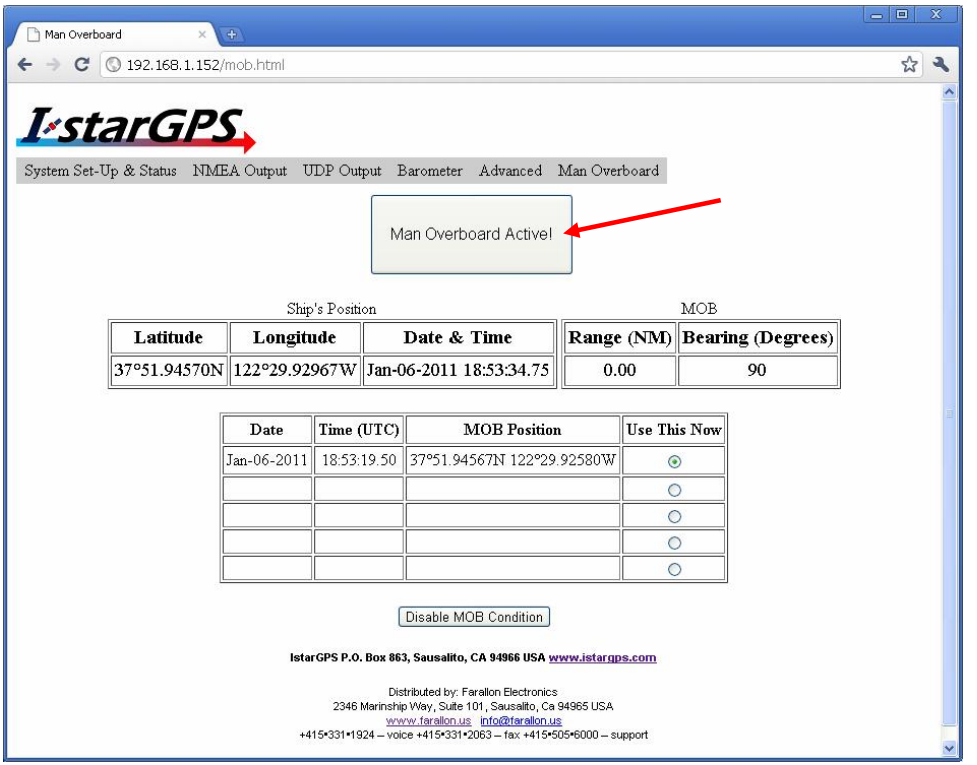


Figure 32 MOB page with MOB button

After Triggering MOB

Several features are available after triggering the MOB

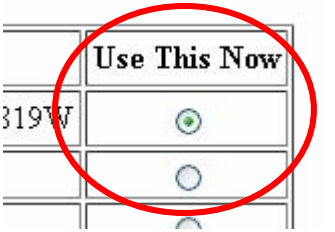
1. The MOB page displays an entry in a table with the Date, Time and Position of the MOB.
2. Display of Range and Bearing from the ship to the MOB position.
3. The ships current position, date and time.
4. Output via the NMEA and UDP channels Bearing to Waypoint – Great Circle (BWC) and Waypoint Location (WPL).

Selecting Successive MOB Entries

The five most recent MOB positions are saved in the webpage table. If there are five saved entries and MOB is triggered again, the oldest entry is discarded.

Under "Use This Now" any of the five entries may be selected to navigate to by clicking the adjacent radio button. Range and bearing data will change accordingly on the webpage and out the NMEA/UDP ports.

Figure 33 "Use This Now" Radio Button



Disabling MOB

The MOB condition can be disabled by clicking the "Disable MOB Condition" button on the MOB webpage. Disabling permanently clears all MOB entries.

Diagnostics

G2 TX LED – Motherboard Green LED

The G2 LED indicates activity of the core GPS module regardless of satellite reception. Within 5 seconds of powering on the IstarGPS, the G2 TX LED should flash rapidly and stay flashing at all times.

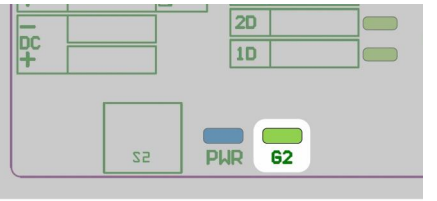


Figure 34 G2 TX LED

Antenna Status - System Set-Up and Status Page

Antenna Status which indicates one of three conditions:

- OK
- Open
- Shorted

Open or Shorted would indicate a problem with the coax, a connector or the antenna itself.

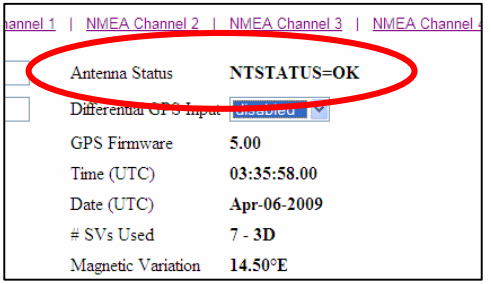


Figure 35 Antenna Status message

NMEA Port Boot-Up Diagnostic Message

Not fully implemented with v.3.0 firmware

At boot-up, the first lines of text transmitted from an NMEA port indicate:

- IP address, subnet
- *CPU firmware version, GPS firmware version*
- *Differential Disabled, 4800 or 9600*
- *NMEA 1 Baud, sentence enabled, update rate in Hz*
- *NMEA 2 Baud, sentence enabled, update rate in Hz*
- *NMEA 3 Baud, sentence enabled, update rate in Hz*
- *NMEA 4 Baud, sentence enabled, update rate in Hz*
- *NMEA UDP, IP address, port , sentence enabled, update rate in Hz*
- *Barometer and Temp units*

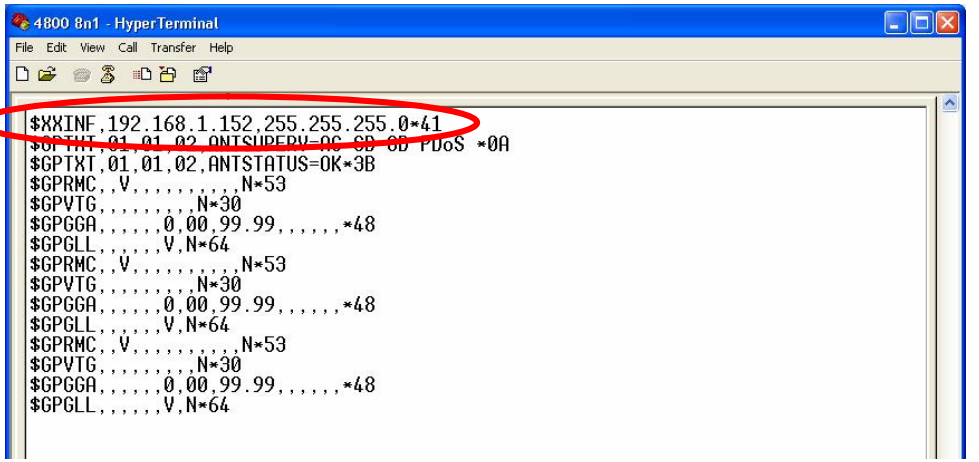


Figure 36 NMEA Port Boot Diagnostics Message

Firmware Flash Programming

The IstarGPS firmware is updated via the USB connector and a Windows PC.

Closing the S1-2 rocker switch adjacent to the text “PROG” (by pressing down on the rocker) puts the IstarGPS in Programming mode In this configuration, the USB connector may only be used for programming. Note: the PEEK/G2 switch must be in the PEEK position (see Fig 15).

GPS functions will not operate properly when in the Program (PROG) mode!

Figure 37 Flash Programming Switch S1 and location

Step by Step Programming Instructions

Download http://www.istargps.com/updaterHS4.zip (~1.7Mb)

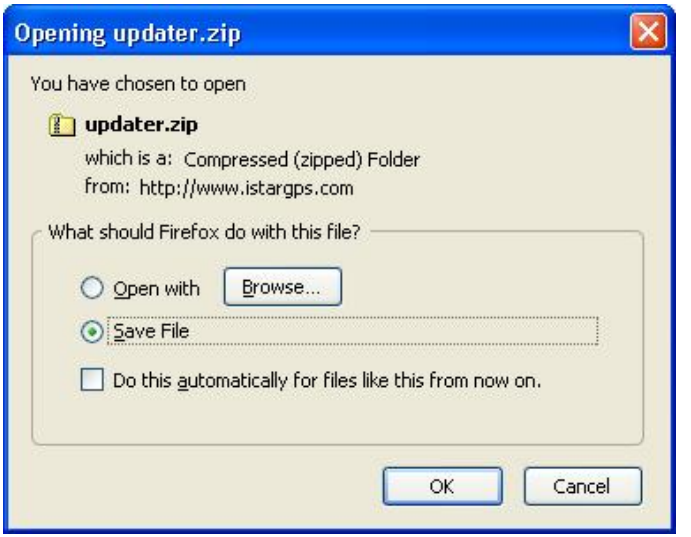


Figure 38 Update utility downloading .zip file

1. Locate the downloaded file (updaterHS4.zip); double click to open a window containing the directory (folder) "IstarGPS HS4 Flash Utilities".
2. **Copy the IstarGPS HS4 Flash Utilities directory to your desktop.** The directory structure of the utility is dependent on a desktop installation
3. Close the window "updaterHS4.zip"
4. Power off the IstarGPS.
5. Move switch S1-2 to the "PROG" position.
6. Connect the IstarGPS USB connector to a Windows PC. If needed, install the USB drivers.
7. Open the IstarGPS HS4 Flash Utilities directory (folder) you copied to your desktop in step 2.

8. Double click **“IstarGPS HS4 Update Utility.exe”**
9. Select the Com port the IstarGPS has created on your PC

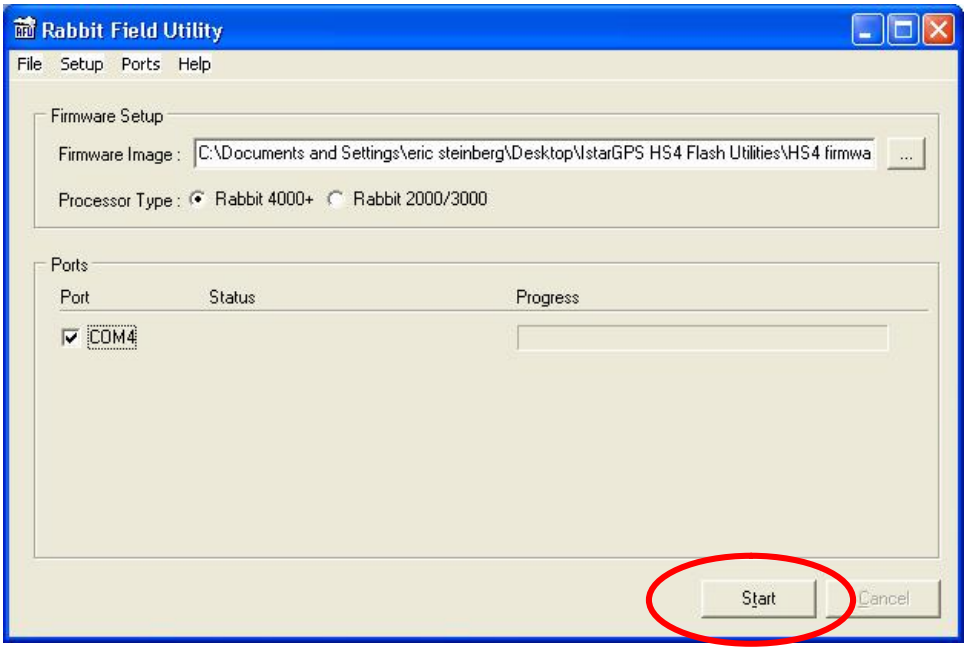
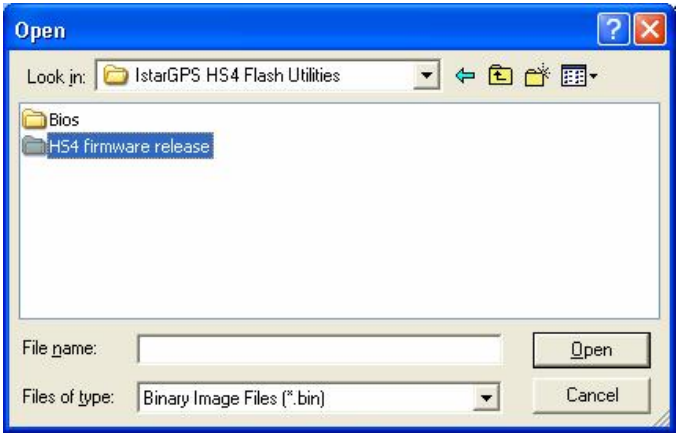


Figure 39 Update Utility com settings

Select a firmware image to send to the IstarGPS:

- File > Load Flash Image...
- Select the new firmware **for your model** located in the IstarGPS HS4 Update Utility directory:

Figure 40
Selecting firmware



Select the file: *modelnumber_version.*bin
EXAMPLE: HS4MkII_v4.0.7.bin

10. After selecting the file, press Start (fig 39), updating will start and status will be indicated. The update takes ~30 seconds.

Figure 41 Elapsed time example

11. Turn off power to the IstarGPS.
12. Move switch S1-2 to the “NORM” position.
13. Turn on power to the IstarGPS.
14. Verify new firmware was loaded successfully by browsing to the Status page of the IstarGPS. The firmware version is displayed in the “CPU Firmware” field.

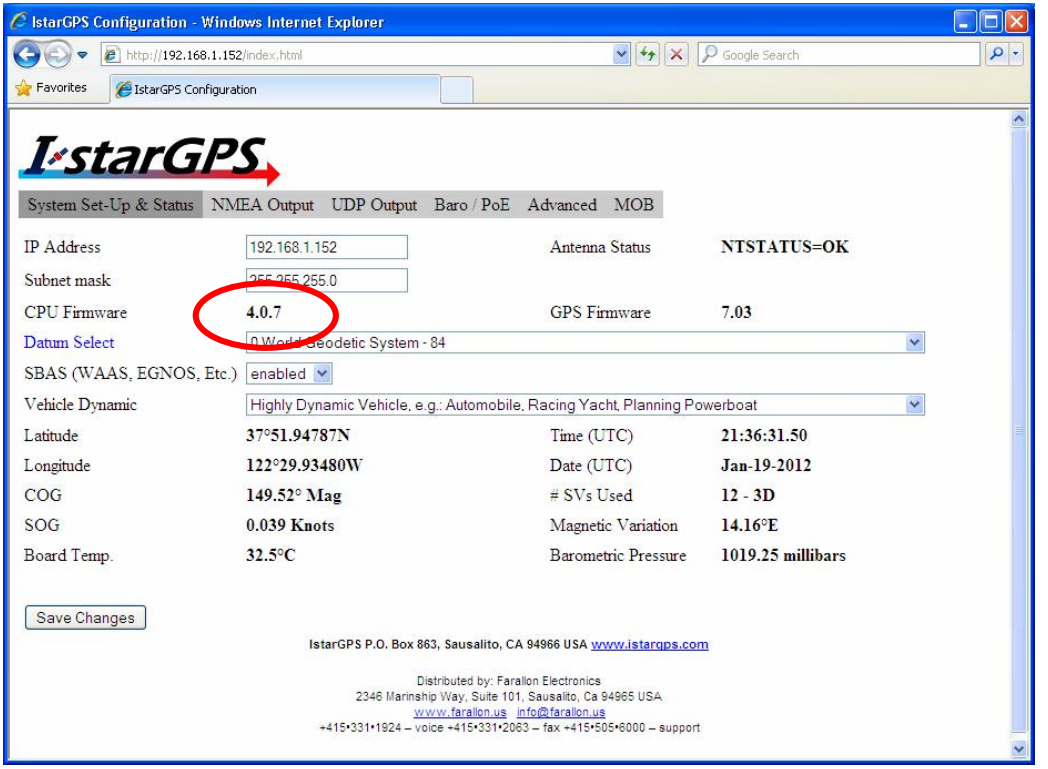


Figure 42 Status page showing CPU version

Warranty

IstarGPS products are warranted for one year (12 months) from the date of sale, to be free of defects in materials and workmanship. The IstarGPS warranty covers a unit that has failed in use during normal operation conforming to the installation guidelines and limitations set fourth in this manual.

If an IstarGPS has failed within the warranty period and warranty service is expected, the customer must initiate technical support with the company the unit was purchased from (Dealer) or contact IstarGPS directly. Contact should be via phone, fax or email and include a detailed description of the failure.

IstarGPS or the Dealer will, at their discretion, either require the unit be returned for evaluation, send an exchange circuit board (PCB) or send a complete advance replacement unit for the customer to exchange on site. The IstarGPS warranty is an "at the factory" warranty meaning that there is no allowance for warranty labor reimbursement for field or in-house services by a Dealer.

IstarGPS will ship replacement parts to a Dealer or customer via UPS 3 Day service or UPS ground, which ever is faster. If a faster shipping method is required, the Dealer or customer will be billed the difference in shipping cost. Shipments outside the United States will be billed at 100% of cost. The customer is responsible for freight and insurance costs to return a defective unit for repair or, if an advance replacement has been provided, return the exchange PCB or exchange unit.

This warranty applies only to products in normal use. It does not apply to units or circuit boards defective due to improper installation, physical damage, tampering, lightning or other electrical discharge or any form of water intrusion / water damage from fresh or salt water. Any unit with an altered serial number will be returned without being repaired.

The foregoing are the only warranties expressed or implied. No other warranties exist. IstarGPS assumes no responsibility for any consequential losses or damages of any nature with respect to any products or services sold, rendered or delivered.

IstarGPS Non-Warranty Repair Policy

When a unit fails after the warranty period, the unit is eligible for a non-warranty repair at a flat fee. Repair charges are based upon the anniversary date of the sale printed on the invoice from IstarGPS or its Dealer. The date of sale may also be verified with a canceled check or credit card receipt in conjunction with the purchase invoice.

Repair Charge Guidelines

- 13th to 36th month - 15% of published list price at time of purchase
- 37th to 60th month - 40% of published list price at time of purchase
- 61st + months - 65% of published list price at time of purchase

Charges are based upon a unit's ability to be repaired subject to parts availability and condition of the unit being repaired. The non-warranty repair policy applies only to products in normal use. Charges for a non-warranty repair may exceed the Repair Charge Guidelines in cases where a unit is extremely damaged. Repair Charge Guidelines do not apply to units or circuit boards defective due to improper installation, physical damage, tampering, lightning or other electrical discharge, unauthorized field repair or any form of water intrusion or water damage from fresh or salt water. Any unit with an altered or missing serial number may be returned without being repaired. All repairs and associated charges are to be authorized by the customer or Dealer prior to repair. Repairs are subject to the discretion of IstarGPS.

Shipping

The customer is responsible for freight and insurance costs to return a unit for repair and for a repaired unit to be return shipped to the customer. IstarGPS will return ship via UPS Ground service or equivalent unless specified otherwise by the customer. International shipping will be via UPS or similar common carrier. Shipping is invoiced at a cost plus basis.

Support Contact Information

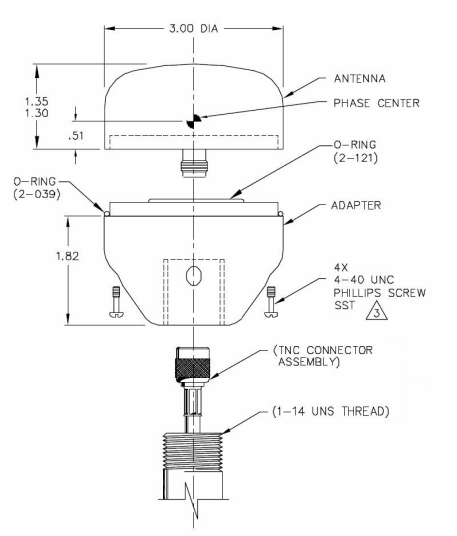
All repairs should be shipped to:

Farallon Electronics
2346 Marinship Way, Suite 101
Sausalito, Ca 94965 USA
www.farallon.us
info@farallon.us

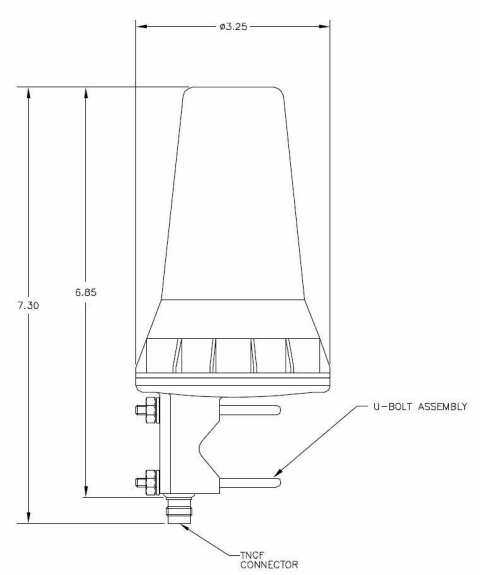
+415•331•1924 – voice
+415•331•2063 – fax
+415•505•6000 – support

IstarGPS
P.O. Box 863
Sausalito, CA 94966 USA
www.istargps.com

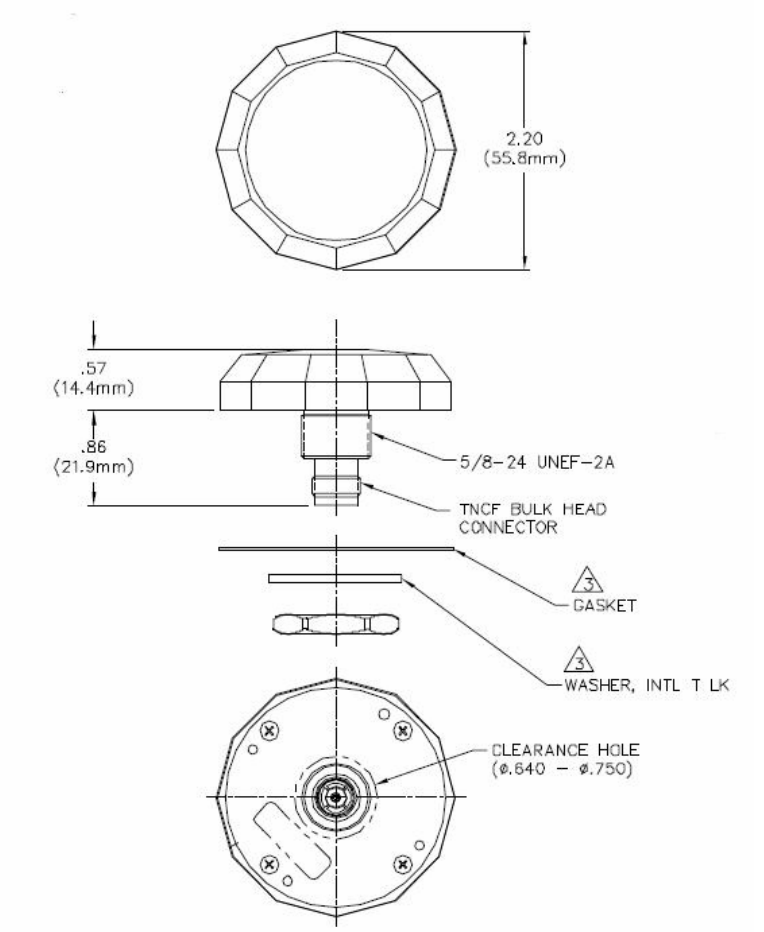
Appendix A – Antenna Options



-ST - Standard marine mount with 1x14 thread base

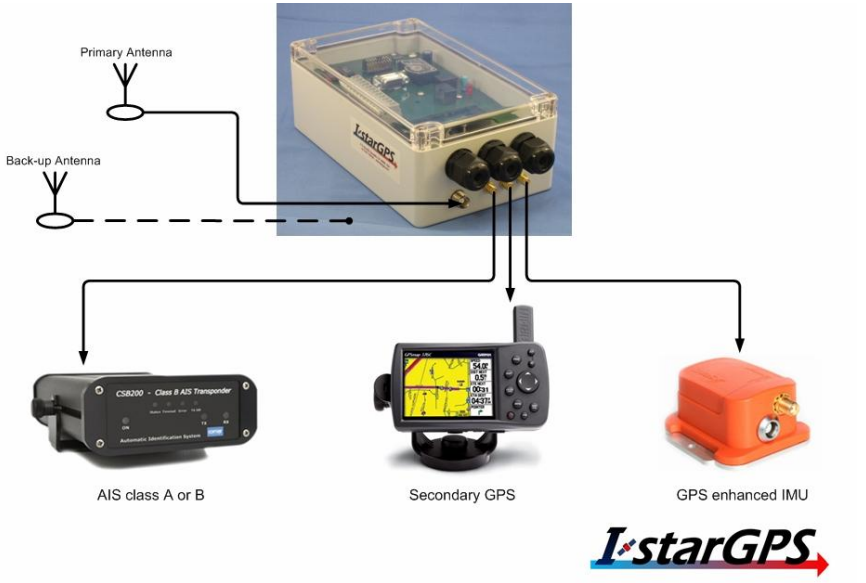


-PM - Pole mount horizontal or vertical pipe, 0.75 to 1.0”



-SM - Surface mount

Appendix B – Optional Antenna Sharing

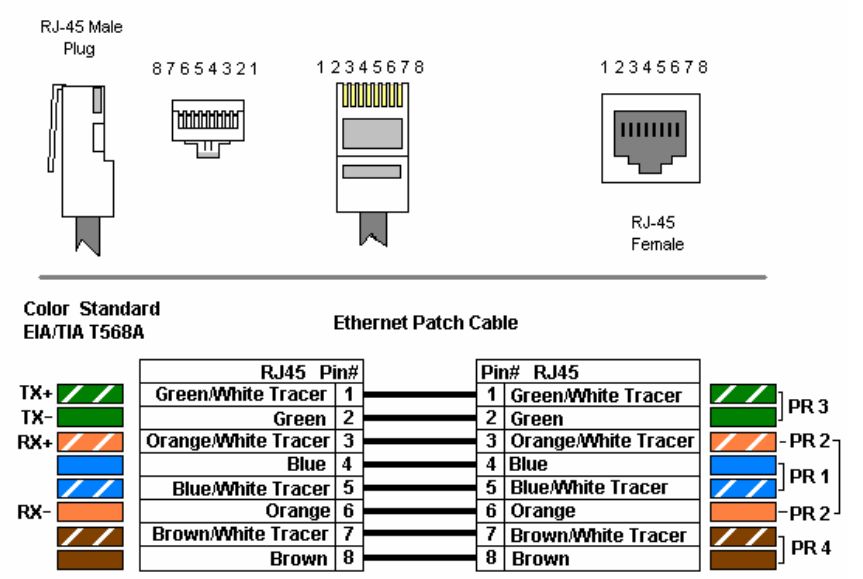


The antenna sharing module enables a single antenna to feed multiple devices. The sharing module may be ordered built into the HS4 (above), or as an external device (below).

Appendix C – Power over Ethernet (PoE)

The IstarGPS HS4MkII is capable of either PASSIVE “PoE In” or “PoE Out”. Passive PoE is defined as a DC voltage across the two extra pairs of wires in a 4 pair Cat5 or 6 cable.

DC voltage + Blue and Blue/Wht
DC voltage – Brown and Brown/Wht



PoE “In” to power the HS4 MkII

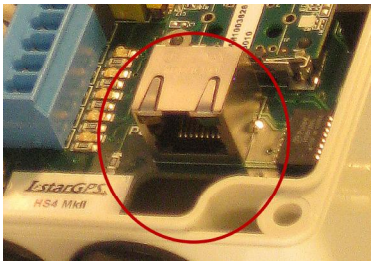
The HS4 MkII may be powered by Passive PoE thus removing the need for DC voltage to be applied to DC+ and – on the terminal strip. Input voltage range is the same specification as defined elsewhere in this manual. No action is required of the user for PoE In to power the HS4 MkII.

PoE "Out" to power other devices from the HS4 MkII

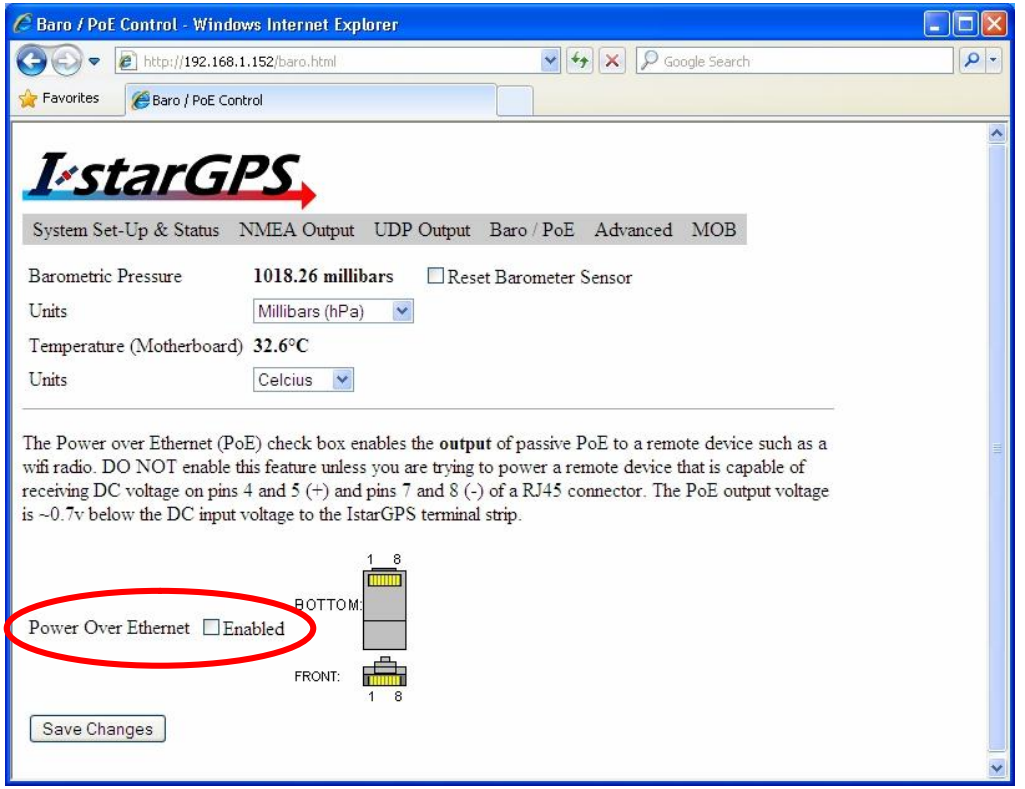
The HS4 MkII can be configured to send PoE out. This is useful for powering a Wifi radio or network switch that is Passive PoE capable.

The Hs4 MkII must have supply voltage applied to the DC + and – terminals in order to use PoE Out. The PoE voltage is approximately 0.5v lower than the input voltage to the HS4 MkII.

1. Power the HS4 MkII from DC mains, usually from a distribution breaker panel.
2. Connect the PoE capable device to the RJ45 (Ethernet connector) via a 4 pair Cat5 or 6 cable.



3. Enable PoE out by selecting the PoE Out check box. On the Baro/PoE page.
4. The blue "PoE" LED next to the RJ45 jack will illuminate
5. Press "Save Changes"


Baro / PoE Control - Windows Internet Explorer
http://192.168.1.152/baro.html
Google Search
Favorites
Baro / PoE Control
IstarGPS
System Set-Up & Status
NMEA Output
UDP Output
Baro / PoE
Advanced
MOB
Barometric Pressure
1018.26 millibars
Reset Barometer Sensor
Units
Millibars (hPa)
Temperature (Motherboard)
32.6°C
Units
Celcius
The Power over Ethernet (PoE) check box enables the output of passive PoE to a remote device such as a wifi radio. DO NOT enable this feature unless you are trying to power a remote device that is capable of receiving DC voltage on pins 4 and 5 (+) and pins 7 and 8 (-) of a RJ45 connector. The PoE output voltage is ~0.7v below the DC input voltage to the IstarGPS terminal strip.
Power Over Ethernet
Enabled
1 8
BOTTOM:
FRONT:
1 8
Save Changes

Appendix D – Ucenter Software

READ THIS: Ucenter is diagnostic software from Ublox, a provider of embedded positioning and wireless communication solutions. Ucenter is intended strictly for advanced users! IstarGPS and its agents strongly recommend you only use Ucenter if you have prior knowledge of the implications settings changes invoked by use of Ucenter may have on the navigational output of the IstarGPS.

Ucenter provides a powerful tool for evaluation, performance analysis and configuration of the IstarGPS receiver. Its flexibility makes the Ucenter software a valuable tool for evaluation, analysis and advanced configuration of the IstarGPS.

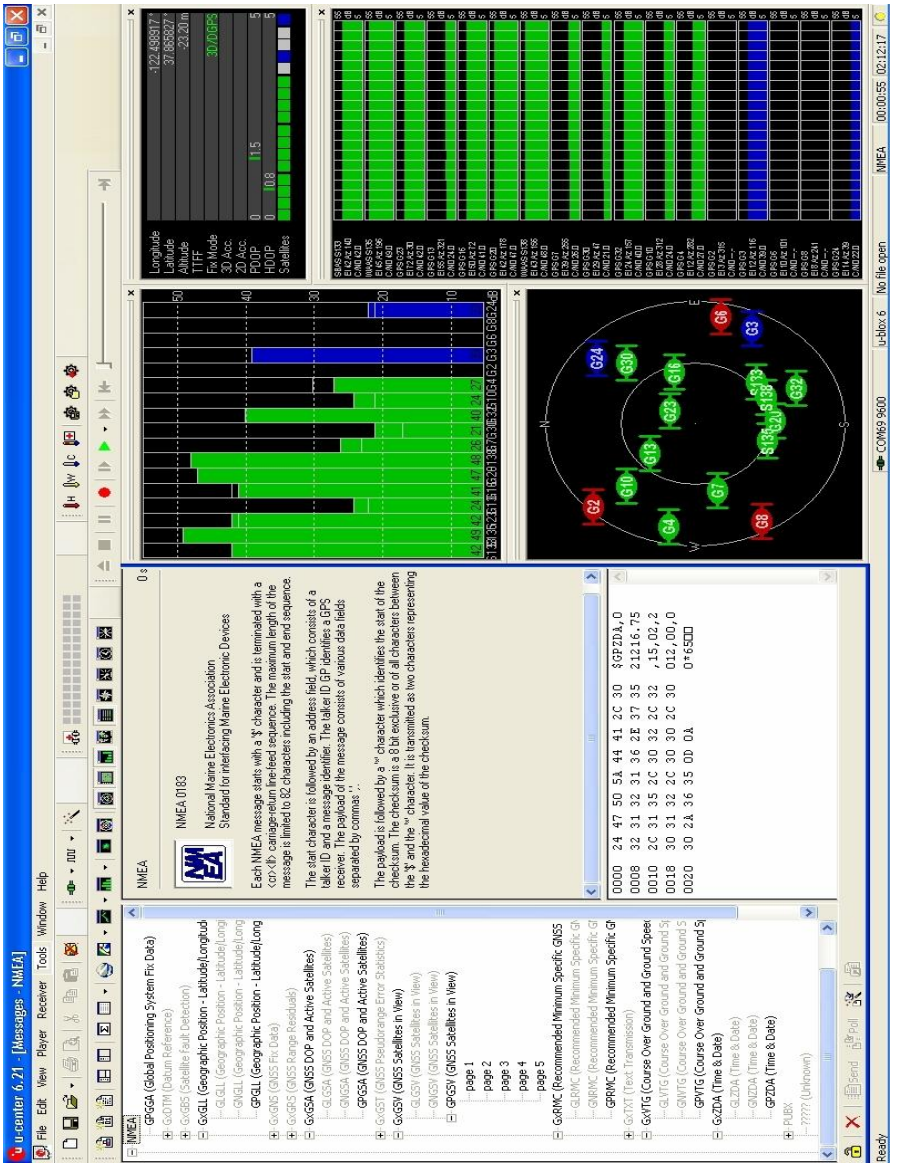
Used in conjunction with the Advanced tab of the IstarGPS User Interface (web page), custom settings can be invoked in Ucenter and saved to the IstarGPS memory for use on reboot, regardless if Ucenter is running.

Please refer to the Ucenter Users Guide for details on operation of the software and the Advanced tab operation in the Operation section of this manual.

Configuring the IstarGPS for use with Ucenter

READ THIS: You MUST have the Ublox Driver installed to use the following configuration. The IstarGPS may STOP NAVIGATING if the driver is not installed properly for use when the IstarGPS USB port is plugged into a PC.

- Install Ucenter software and the USB driver for your operating system (internet access required).
- With power off, move the “USB Select” switch to the G2 position.
- Power on the IstarGPS
- Connect the IstarGPS USB port to a PC USB port.



Sample Ucenter configuration page

Appendix E – IstarGPS MOB Switch with LED

IstarGPS offers an IP67 rated momentary contact switch with integral LED for used with the MOB feature of the IstarGPS.

The integral LED may be illuminated from any DC voltage source, however we recommend using the 5 volt output from the IstarGPS.

When wired to the IstarGPS 5 volt output, the recommended series resistor values for night light levels are:

177k for Red LED = 1.6v at LED
10k for Green LED = 1.8v at LED

LED Specifications	Forward current	Voltage	Intensity
Red LED	20ma	2v	125 mcd
Green LED	10ma	2v	20 mcd

Exceeding the rated voltage will damage the LED!!

Appendix F - Supported Datums

World Geodetic System - 84 (WGS84)
World Geodetic System - 72 (WGS72)
Earth-90 - GLONASS Coordinate system
Adindan - Mean Solution (Ethiopia & Sudan)
Adindan - Burkina Faso
Adindan - Cameroon
Adindan - Ethiopia
Adindan - Ma l i
Adindan - Senegal
Adindan - Sudan
Afgooye - Somalia
ARC 1950 - Mean (Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe)
ARC 1950 - Botswana
ARC 1950 - Burundi
ARC 1950 - Lesotho
ARC 1950 - Malawi
ARC 1950 - Swaziland
ARC 1950 - Zaire
ARC 1950 - Zambia
ARC1950 - Zimbabwe
ARC 1960 - Mean (Kenya, Tanzania)
Ayabelle Lighthouse - Djibouti
Bissau - Guinea-Bissau
Cape - South Africa
Carthage - Tunisia
Dabola - Guinea
Leigon - Ghana
Liberia 1964
Massawa - Eritrea (Ethiopia)
Merchich - Morocco
Minna - Cameroon
Minna - Nigeria
M'Poraloko - Gabon
North Sahara 1959 - Algeria
Old Egyptian 1907 - Egypt
Point 58 - Mean Solution (Burkina Faso & Niger)
Pointe Noire 1948 - Congo
Schwarzeck - Namibia
Voirol 1960 - Algeria
Ain El Abd 1970 - Bahrain Island
Ain El Abd 1970 - Saudi Arabia
Djakarta (Batavia) - Sumatra (Indonesia)
Hong Kong 1963 - Hong Kong
Hu-Tzu-San - Taiwan
Indian - Bangladesh

Indian - India & Nepal
Indian 1954 - Thailand
Indian 1960 - Vietnam (near 16N)
Indian 1960 - Con Son Island (Vietnam)
Indian 1975 - Thailand
Indonesian 1974
Kandawala - Sri Lanka
Kartau 1948 - West Malaysia & Singapore
Nahrwan - Masirah Island (Oman)
Nahrwan - United Arab Emirates
Nahrwan - Saudi Arabia
Oman
Qatar National - Qatar
South Asia - Singapore
Timbalai 1948 - Brunei & East Malaysia (Sarawak & Sabah)
Tokyo - Mean Solution (Japan,Okinawa & South Korea)
Tokyo - Japan
Tokyo - Okinawa
Tokyo - South Korea
Australian Geodetic1966 - Australia & Tasmania
Australian Geodetic 1984 - Australia & Tasmania
European 1950 - Mean (AU, B, DK, FN, F, G, GER, I, LUX, NL, N, P, E, S, CH)
European 1950 - Western Europe (AU, DK, FR, GER, NL, CH)
European 1950 - Cyprus
European 1950 - Egypt
European 1950 - England, Wales, Scotland &Channel Islands
European 1950 - England, Wales, Scotland & Ireland
European 1950 - Greece
European 1950 - Iran
European 1950 - Italy - Sardinia
European 1950 - Italy - Sicily
European 1950 - Malta
European 1950 - Norway & Finland
European 1950 - Portugal & Spain
European 1950 - Tunisia
European 1979 - Mean Solution (AU, FN, NL, N, E, S, CH)
Hjorsey 1955 - Iceland
Ireland 1965
Ordnance Survey of GB 1936 - Mean (E, IoM, S, ShI, W)
Ordnance Survey of GB 1936 - England
Ordnance Survey of GB 1936 - England, Isle of Man & Wales
Ordnance Survey of GB 1936 - Scotland & Shetland Isles
Ordnance Survey of GB 1936 - Wales
Rome 1940 - Sardinia Island
S-42 (Pulkovo 1942) - Hungary
S-JTSK Czechoslavakia (prior to 1 Jan 1993)
Cape Canaveral - Mean Solution (Florida & Bahamas)
N. American 1927 - Mean Solution (CONUS)

N. American 1927 - Western US
N. American 1927 - Eastern US
N. American 1927 - Alaska (excluding Aleutian Islands)
N. American 1927 - Aleutian Islands, East of180W
N. American 1927 - Aleutian Islands, West of 180W
N. American 1927 - Bahamas (excluding SanSalvador Island)
N. American 1927 - San Salvador Island
N. American 1927 - Canada Mean Solution (including Newfoundland)
N. American 1927 - Alberta & British Columbia
N. American 1927 - Eastern Canada (Newfoundland, New Brunswick, Nova Scotia & Quebec)
N. American 1927 - Manitoba & Ontario
N. American 1927 - Northwest Territories & Saskatchewan
N. American 1927 - Yukon
N. American 1927 - Canal Zone
N. American 1927 - Caribbean
N. American 1927 - Central America
N. American 1927 - Cuba
N. American 1927 - Greenland (Hayes Peninsula)
N. American 1927 - Mexico
N. American 1983 - Alaska (excluding Aleutian Islands)
N. American 1983 - Aleutian Islands
N. American 1983 - Canada
N. American 1983 - Mean Solution (CONUS)
N. American 1983 - Hawaii
N. American 1983 - Mexico & Central America
Bogota Observatory - Colombia
Campo Inchauspe 1969 - Argentina
Chua Astro - Paraguay
Corrego Alegre - Brazil
Prov S. American 1956 - Mean Solution (Bol, Col, Ecu, Guy, Per & Ven)
Prov S. American 1956 - Bolivia
Prov S. American 1956 - Northern Chile (near 19S)
Prov S. American 1956 - Southern Chile (near 43S)
Prov S. American 1956 - Colombia
Prov S. American 1956 - Ecuador
Prov S. American 1956 - Guyana
Prov S. American 1956 - Peru
Prov S. American 1956 - Venezuela
Prov South Chilean 1963
South American 1969 - Mean Solution (Arg, Bol, Bra, Chi, Col, Ecu, Guy, Par, Per, Tri & Tob, Ven)
South American 1969 - Argentina
South American 1969 - Bolivia
South American 1969 - Brazil
South American 1969 - Chile
South American 1969 - Colombia
South American 1969 - Ecuador (excluding Galapagos Islands)
South American 1969 - Baltra, Galapagos Islands
South American 1969 - Guyana

South American 1969 - Paraguay
South American 1969 - Peru
South American 1969 - Trinidad & Tobago
South American 1969 - Venezuela
Zanderij - Suriname
Antigua Island Astro 1943 - Antigua, Leeward Islands
Ascension Island 1958
Astro Dos 71/4 - St Helena Island
Bermuda 1957 - Bermuda Islands
Deception Island, Antarctica
Fort Thomas 1955 - Nevis, St Kitts, Leeward Islands
Graciosa Base SW 1948 - Faial, Graciosa, Pico, Sao Jorge, Terceira Islands (Azores)
ISTS 061 Astro 1968 - South Georgia Islands
L.C. 5 Astro 1961 - Cayman Brac Island
Montserrat Island Astro 1958 - Montserrat Leeward Islands
Naparima, BWI - Trinidad & Tobago
Observatorio Meteorologico 1939 - Corvo and Flores Islands (Azores)
Pico De Las Nieves - Canary Islands
Porto Santo 1936 - Porto Santo and Madeira Islands
Puerto Rico - Puerto Rico & Virgin Islands
Qornoq - South Greenland
Sao Braz - Soa Miguel, Santa Maria Islands (Azores)
Sapper Hill 1943 - East Falkland Island
Selvagem Grande 1938 - Salvage Islands
Tristan Astro 1968 - Tristan du Cunha
Anna 1 Astro 1965 - Cocos Islands
Gandajika Base 1970 - Republic of Maldives
ISTS 073 Astro 1969 - Diego Garcia
Kerguelen Island 1949 - Kerguelen Island
Mahe 1971 - Mahe Island
Reunion - Mascarene Islands
American Samoa 1962 - American Samoa Islands
Astro Beacon E 1945 - Iwo Jima
Astro Tern Island (Frig) 1961 - Tern Island
Astronomical Station 1952 - Marcus Island
Bellevue (IGN) - Efate and Erromango Islands
Canton Astro 1966 - Phoenix Islands
Chatham Island Astro 1971 - Chatham Island (New Zeland)
DOS 1968 - Gizo Island (New Georgia Islands)
Easter Island 1967 - Easter Island
Geodetic Datum 1949 - New Zealand
Guam 1963 - Guam Island
GUX 1 Astro - Guadalcanal Island
Indonesian 1974 - Indonesia
Johnston Island 1961 - Johnston Island
Kusaie Astro 1951 - Caroline Islands, Fed States of Micronesia
Luzon - Philippines (excluding Mindanao Island)
Luzon - Mindanao Island (Philippines)

Midway Astro 1961 - Midway Islands
Old Hawaiian - Mean Solution
Old Hawaiian - Hawaii
Old Hawaiian - Kauai
Old Hawaiian - Maui
Old Hawaiian - Oahu
Pitcairn Astro 1967 - Pitcairn Island
Santo (Dos) 1965 - Espirito Santto Island
Viti Levu 1916 Viti Levu Island (Fiji Islands)
Wake-Eniwetok 1960 - Marshall Islands
Wake Island Astro 1952 - Wake Atoll
Bukit Rimpah - Bangka and Belitung Islands (Indonesia)
Camp Area Astro McMurdo Area, Antarctica
European 1950 - Iraq, Israel, Jordan, Kuwait, Lebanon, Saudi Arabia & Syria
Gunung Segara - Kalimantan (Indonesia)
Herat North - Afghanistan
Indian - Pakistan
Pulkovo 1942 Russia
Tananarive Observatory 1925 - Madagascar
Yacare - Uruguay
Krassovsky 1942 - Russia
Lommel Datum 1950 - Belgium & Luxembourg
Reseau National Belge 1972 - Belgium
NTF - Nouvelle Triangulation de la France
Netherlands 1921 - Netherlands
European Datum 1987, IAG RETrig Subcommision.
Swiss Datum 1903+ (LV95)

Appendix G - Packing List

The following items are supplied with an IstarGPS HS4:

Qty 1 IstarGPS sensor
Qty 1 Antenna sensor
Qty 1 Antenna cable, 50 ohm RG58, 50’
Qty 1 TNC connector, crimp for RG58
Qty 1 TNC connector 90 degree, crimp for RG58
Qty 1 3’ (.91m) Cat5 cable, straight through
Qty 1 6’ (1.82m) Mini USB to USB A
Qty 1 CD with update utilities, USB drivers, Ucenter, PDF of manual