

A large blue stylized 'S' logo with a white swoosh, similar to the one in the top right header.

C-NaviGator III

CONTROL & DISPLAY

User Manual

Revision 2

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Manual Organization

This manual describes how to install, configure, and operate the C-NaviGator III GNSS Control & Display unit from C & C Technologies, Inc. Sections are organized in a manner that facilitates quick operator orientation.

There are two major sections of this manual; [Software](#) (Page 12) and [Hardware](#) (Page 61).

[Section 1 - Overview](#) (Page 13) gives a general overview of the software running on the C-NaviGator III. Instructions to guide the operator through installation and setup are provided in [Section 2 - Operator Instructions](#) (Page 15).

Detailed menu descriptions can be found in [Section 3 - Menus](#) (Page 20). Configuration for supported devices is in [Section 4 - Devices](#) (Page 37).

[Section 5 - Maintenance](#) (Page 60) concentrates on maintenance and troubleshooting.

An overview of the hardware is in [Section 6 - General](#) (Page 62). [Section 7 - Installation](#) (Page 64) discusses how to properly mount and install the C-NaviGator III.

[Section 8 – Physical Connections](#) (Page 69) describes all of the connections to the C-NaviGator III. General operating procedures are discussed in [Section 9 - Operation](#) (Page 72).

Technical specifications of the C-NaviGator III and its accessories are detailed in [Section 10 - Specifications](#) (Page 74) and [Section 11 - Specifications of Accessories](#) (Page 77).

Conventions

Arial font is used for plain text in this document.

Arial italic font is used for settings names.

“Arial quoted” font is used for settings values.

Arial Bold font is used for button names.

Arial Bold Italic font is used for menu items.

[Arial Blue](#) font is used for cross-references.

[Arial Blue Underline](#) font is used for hyperlinks.

Arial red italic is used for typed commands.

Important notes are displayed in shaded text boxes

Please note:

Such note boxes display important information that should not be ignored.

Simple file content is displayed in Courier New Black font in a text box.

```
#Sample File  
Version 0.1
```

Software

Section 1 - Overview

Introduction

The C-NaviGator III is a self-contained Control / Display Unit that provides a number of visual aids to help the user monitor the quality, performance, and accuracy of the position information supplied by the GNSS receiver. Position calculations are performed by the C-NaviGator III along with data quality assessments to create visual and graphical data representations that instantly



convey critical information to the operator. Information from external sensors is displayed in a form that enables the user to quickly recognize a decrease in reliability of the position solution. The C-NaviGator III's processor-based, windows style operating environment is straightforward and easy to use.

Information screens provide the necessary user interface. Data entry and command functions are entered through the use of the touch-screen. Information displays, alarm indicators, parameter settings, data analysis, etc. are displayed on the C-NaviGator III's color LCD screen. Alarm or alert states are configured by the operator.

Position calculations are performed for data output to other systems as configured by the operator. Through the C-NaviGator III, the operator has easy access to input and output controls.

Features and Functions

- Monitoring of NMEA compliant GNSS systems
- Saving / loading of settings
- Logging of GNSS data
- User selectable units for distance, height and speed

- User selectable time zones
- Day / night display brightness settings
- Help documentation
- Software updates via USB
- Input / Output all NMEA versions (2.1 / 3.0 / 3.1)
- Multiple Input / Output ports (4 x RS232)
- Single RS422 Input / Output port
- Monitoring screens include
 - Satellite Information
 - Error Ellipse
 - Scatter Plot
 - Quality Alert Graphs
 - Position Comparison
 - Event Log "Fixes"
 - Alarms
- Display of current Quality Information with Alerts
 - Frequency Mode of Solution
 - 2D / 3D Status
 - Correction Type
 - Correction Age
 - Number of Satellites used for Solution
 - HDOP, VDOP and PDOP
 - Figure of Merit
 - Signal Strength

C-Nav Specific Features and Functions

- Control and monitoring of C-Nav3050 receivers
- Control and monitoring of C-Nav2050 receivers
- Control and monitoring of C-Nav2000 receivers
- Control and monitoring of C-Nav1010 receivers
- Interface for the user to enter Activation / Deactivation Codes
- Monitoring and control of the correction signal demodulator
- Updating of the receiver's firmware
- Viewing of L1 and L2 signal strengths for each tracked satellite

Section 2 - Operator Instructions

Power-Up

During the power up sequence, the operator has the option to install new software from C & C Technologies. As updates become available, the user will be able to download the software from the C-Nav ftp site and transfer it to a USB memory device. A flash memory stick is supplied with each unit. See [Updating Software](#) (Page 60) for details.

Allow at least one minute for the system to initialize. Program start is automatic and the last settings stored by the user are recalled. The default screen is the [Satellite Info](#) screen.

For a description of the C-NaviGator III display screens, see [View](#) (Page 23). If this page does not contain the information described, refer to [Troubleshooting](#) (Page 60).

Screen Layout

The C-NaviGator III screen provides easy access to system information and control functions. Positioning information and time of the active device are shown across the top of the screen. Below the position information is the Menu. The type of information to be displayed in the center of the screen is selected by the operator using the menus described in [Section 3 - Menus](#) (Page 20). System performance and the quality of the position solution are conveyed by means of red, yellow and green indicators in the right screen panel (Quality Panel). Indicator colors change according to the limits set by the operator for each parameter. See [Quality Panel Thresholds](#) (Page 32) for details. The main system "Alarm" appears in red on the right side of the screen. Along the bottom are navigation buttons to move between screens, as well as an indicator of which screen is displayed in relation to the menu grouping.



Menus

- **File** – Configuration storage, recall and reset
- **View** – Monitoring screen selection
- **Settings** – View, enter, or adjust operating parameters
- **{Device} Settings** – Settings for individual receivers
- **Help** – Display and control screen setting descriptions

Active Device Information

- **Position**
- **Date and time**
- **Course**
- **Speed**

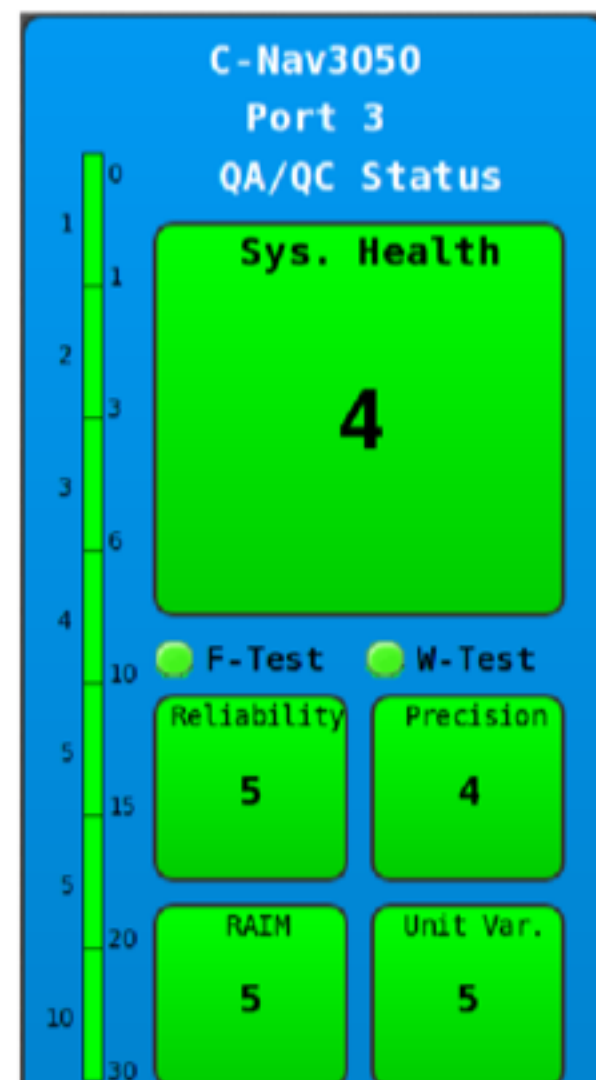
GNSS Quality Alert Indicators

- **Freq** – Mode of operation.
- **Mode** – Position solutions with or without height.
- **Corr** – Indicates the current source of correction data.
- **Diff Age** – Time in seconds since last valid correction.
- **F-Test** – Pass or Fail of the F-Test
- **FOM** – Figure of Merit
- **# SVS** – Number of satellites used in position solution.
- **SNR** – Signal to Noise Ratio
- **VDOP** – Vertical Dilution of Precision
- **PDOP** – Position Dilution of Precision
- **Net** – The Network of the CCS Satellite
- **HDOP** – Horizontal Dilution of Precision



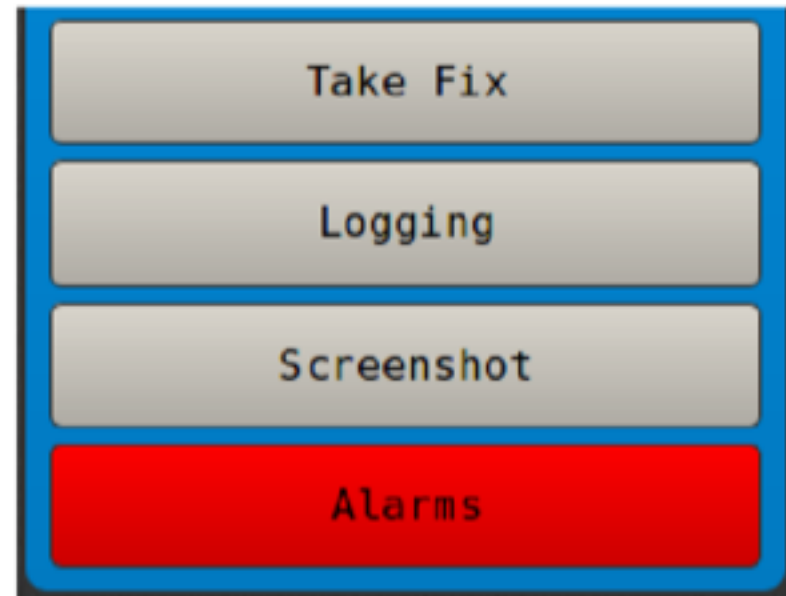
QA/QC Status Indicator

- **Sys. Health** – Overall recent health of the system on a scale of 1-5
- **F-Test** - Recent F-Test health on a scale of 1-5
- **W-Test** - Recent W-Test health on a scale of 1-5
- **RAIM** - Recent RAIM health on a scale of 1-5
- **Unit Var.** - Recent Unit Variance health on a scale of 1-5



Main Buttons

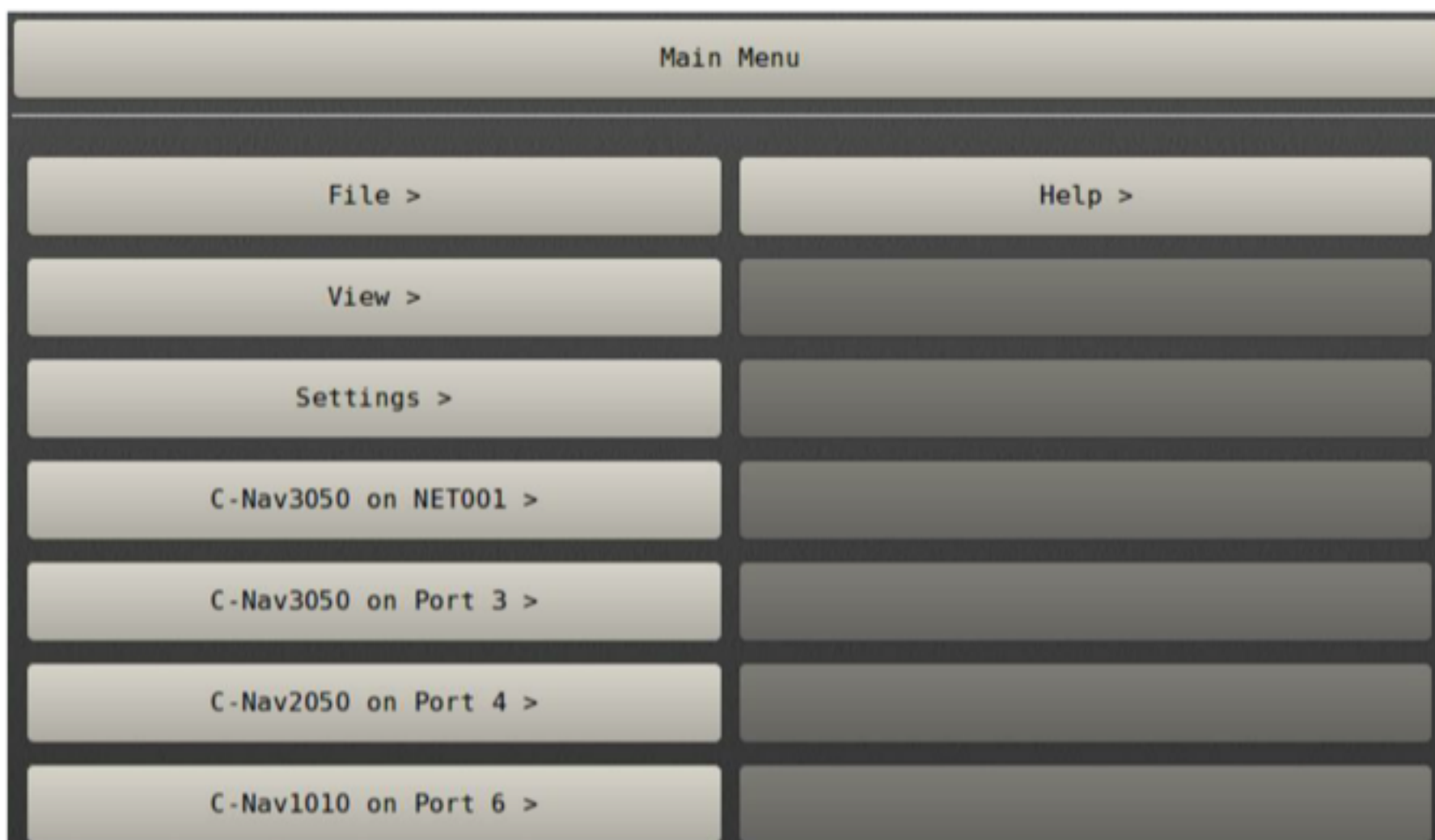
- **Take Fix** – Take a fix of the current position.
- **Logging** – Open the Logging Setting screen.
- **Screenshot** – Take a screenshot of the C-NaviGator III display.
- **Alarms** – Open the Alarms screen. Will be red when there is an active alarm.



Operation

- 1) Apply power to the C-NaviGator III by connecting the power supply to the back of the C-NaviGator III unit.
- 2) In a few seconds, the system menu will appear allowing the option to update the internal program, calibrate the touch-screen or begin normal operation (default). If no action from the operator is detected, the C-NaviGator III will automatically launch the program. This will take several seconds.
- 3) The C-NaviGator III automatically recalls the last settings saved and displays the [Satellite Info](#) screen. System operating modes and status indicators are seen on the right in the Quality Panel. To the right are the active ports switch, the active port indicator, and the general "Alarm" Indicators. The **Next Device** button provides a means to quickly switch between different input sources for monitoring. The actual port programming and activation are accessed from the **Menu / Settings / Ports** screen as described in [Serial Ports](#) (Page 32).
- 4) Press **Prev** and **Next** on the C-NaviGator III display to scan through the various view screens. Alternatively, press **Menu / View** to select the specific view screen.

Section 3 - Menus



Pull down menus allow operator access to the C-NaviGator III configuration, display options, parameter settings, support documentation, etc. Menus are selected by pressing **Menu** on the display and pressing each subsequent menu item.

File Menu

Load Defaults

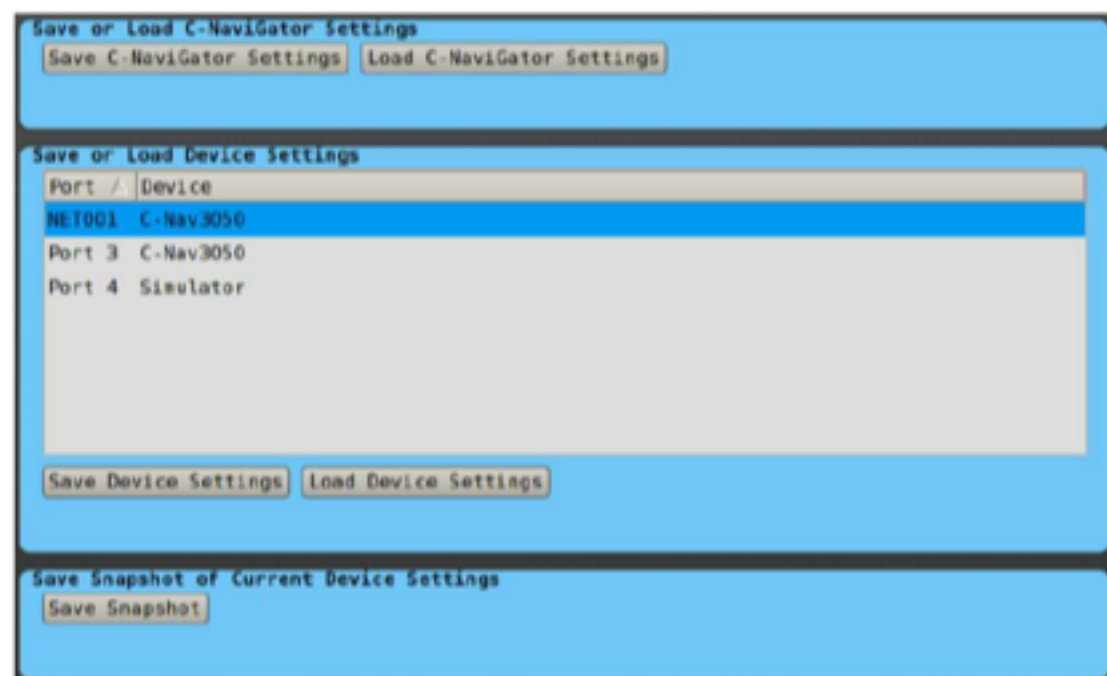
The user can quickly revert the C-NaviGator III to all factory settings as a starting point for a new configuration. When **File / Load Defaults** is selected, the user is required to configure the system, starting with assigning devices to [Serial Ports](#) (Page 32).

Save / Load Settings

To store the C-NaviGator III's current configuration, select **Save C-NaviGator Settings**. These settings can be recalled with the **Load C-NaviGator Settings** command.

To store a receiver's configuration, select the device in the table and press **Save Device Settings**.

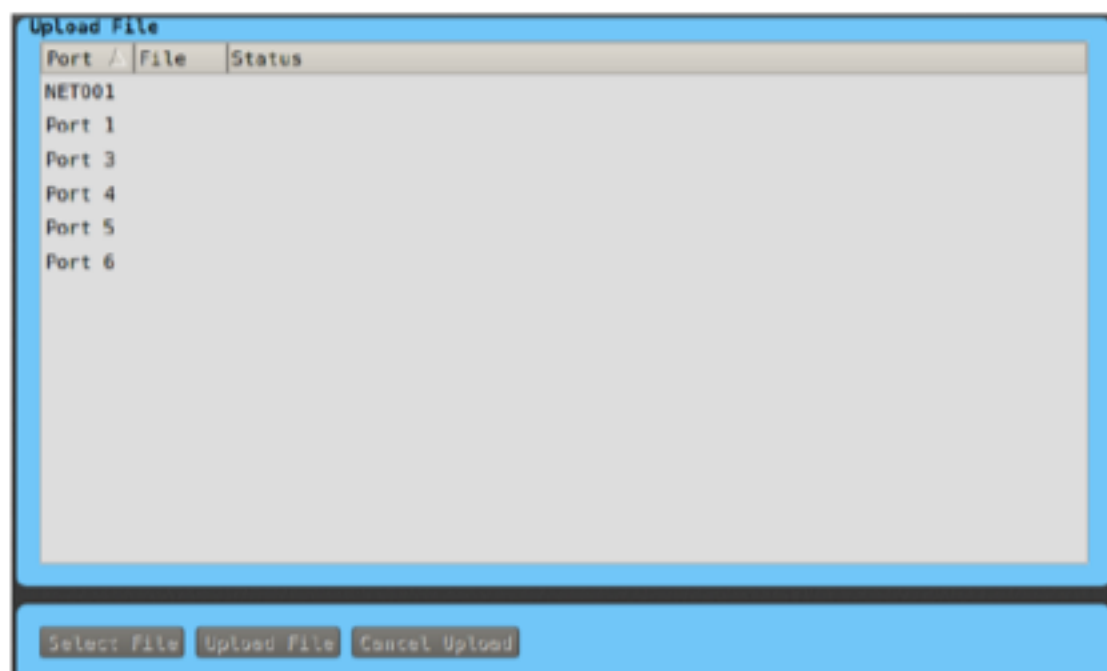
These settings can be recalled with the **Load Device Settings**.



The **Save Snapshot** button will store a human-readable report of the C-NaviGator III, including information for each device.

Upload File

This opens the file upload screen, allowing the user to quickly upload a file to a device.

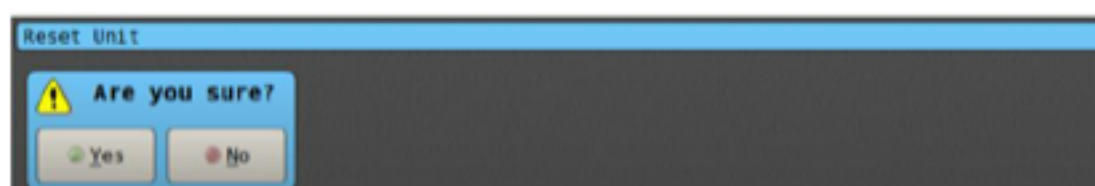


Warning:

Uploading an inappropriate file to the device may render the device inoperable. Use care to only upload files designed for the device.

Reset Unit

Reset Unit causes the C-NaviGator III to restart the internal program.



The operator is asked to confirm the **Reset Unit** command.

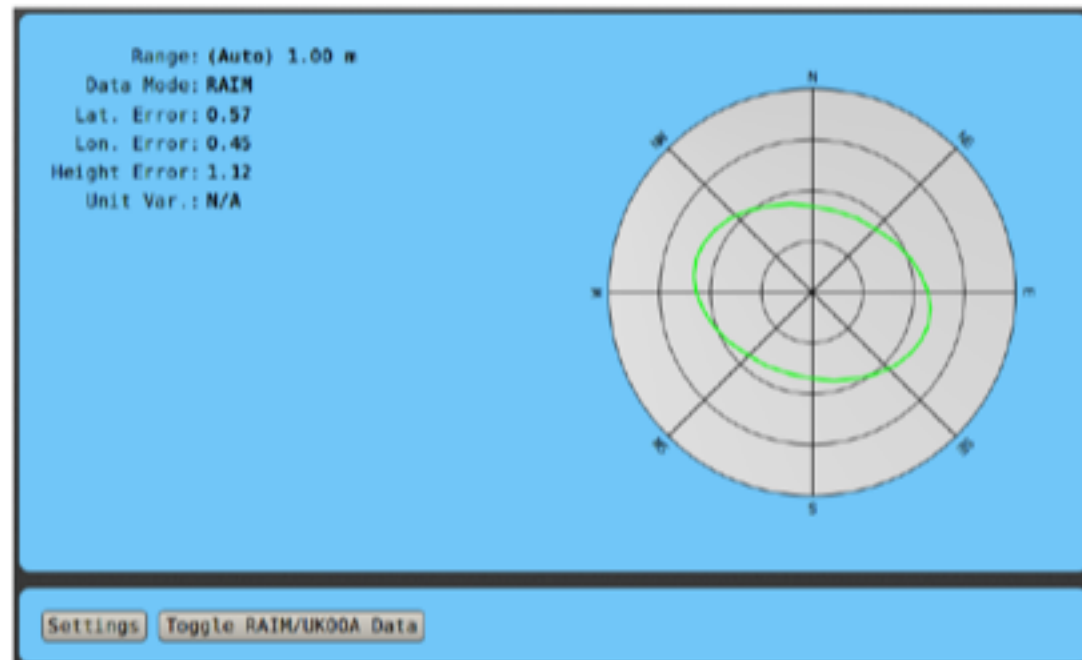
View

Pressing the **Prev** and **Next** buttons from any of these screens will 'walk' through the available View screens. Pressing **Next Device** will change between available position devices to display.

Error Ellipse

The error ellipse graphically represents the sum of the horizontal error uncertainty in the system.

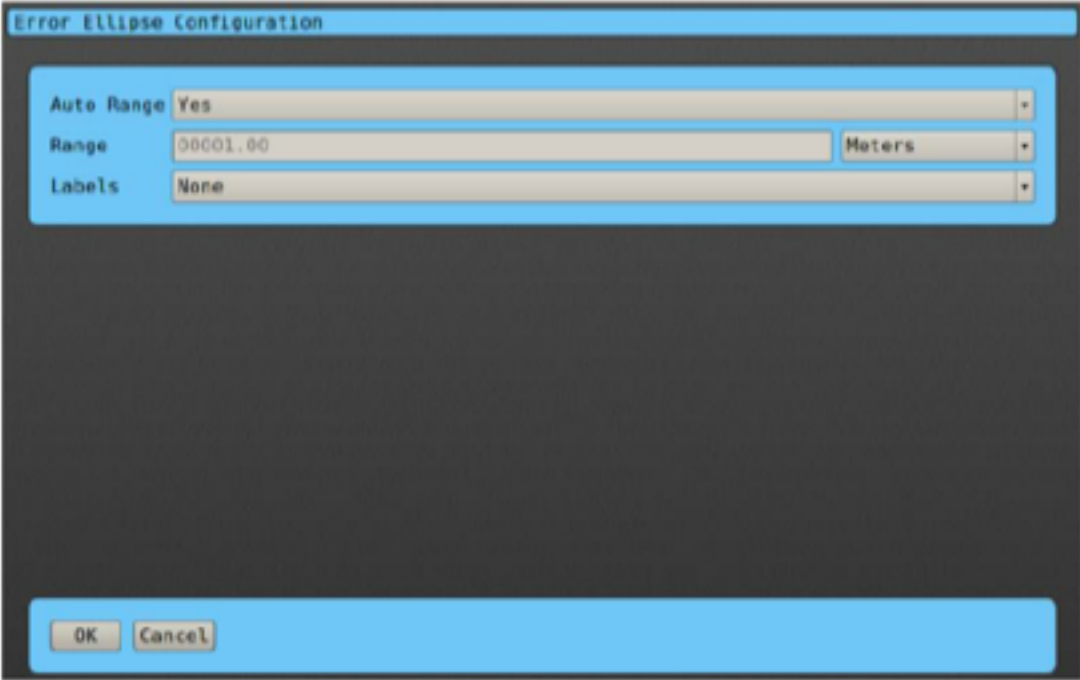
Graphics on the Error Ellipse screen show the error estimate of the PVT solution accuracy (in meters) based on residual analysis.



Pressing the **Toggle RAIM/UKOOA Data** button will alternate the display between the standard RAIM error levels and the more UKOOA error levels.

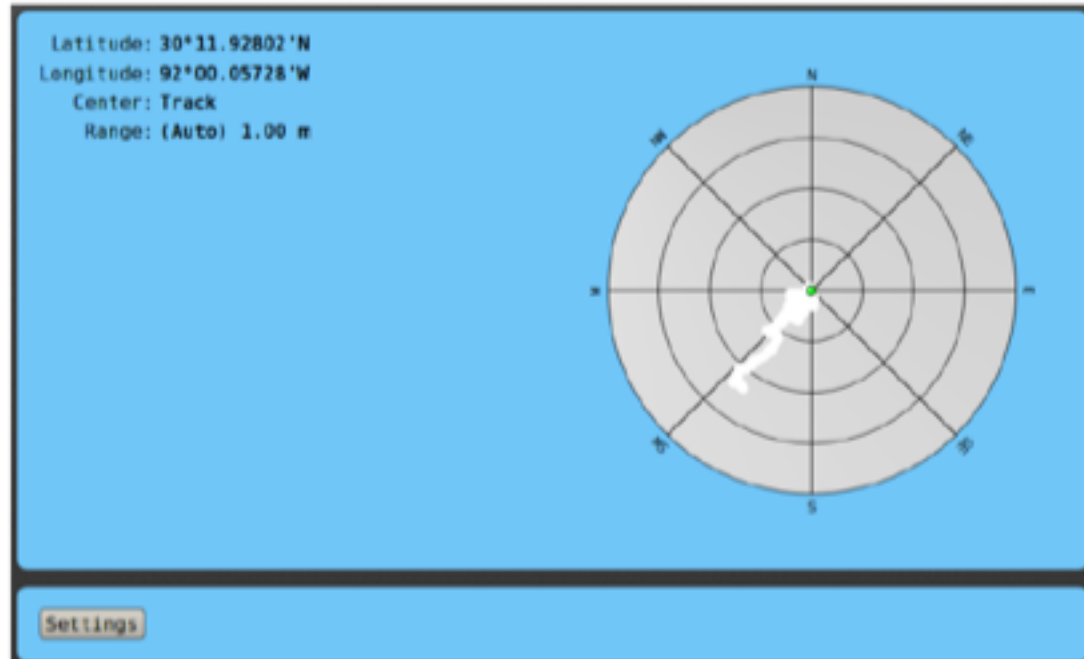
Error Ellipse Settings

Allows the user to set the range of the graph or set it to *Auto Range*. When *Auto Range* is set to "Yes", the range will grow to accommodate the size of the error ellipse. The operator can also choose to display distance labels on the graph.



Scatter Plot

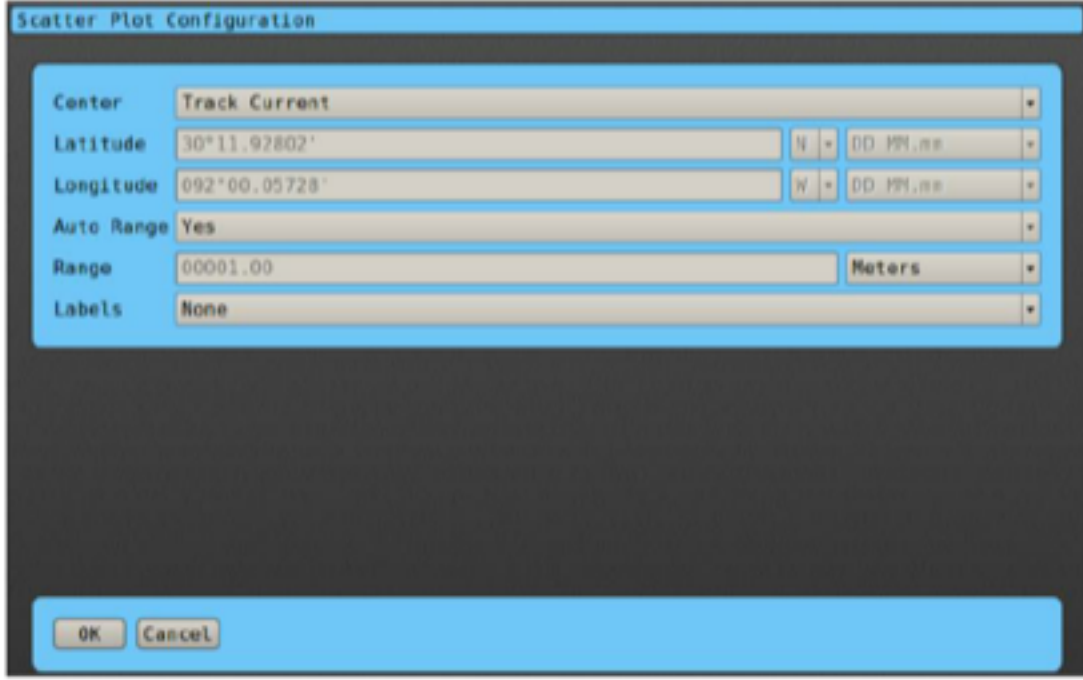
This screen displays a history of the positions received from the GNSS receiver. The reference Latitude and Longitude shown indicates the center position of the graph.



New positions are computed and presented on the scatter plot with error displacements shown referenced to the reference position. The reference position may be set to a “Fixed” position or set to “Track” the latest GNSS fix. The range is the distance from the center of the graph to the outer ring.

Scatter Plot Settings

Using the *Center* drop down you can set the position for the center of the graph. Select “Track Current” to track the current position. Choose “Fixed (Manual)”, to enter the latitude and longitude. Choose “Fixed (Here)”, to use the current position as the graph center.



Scatter Plot Configuration

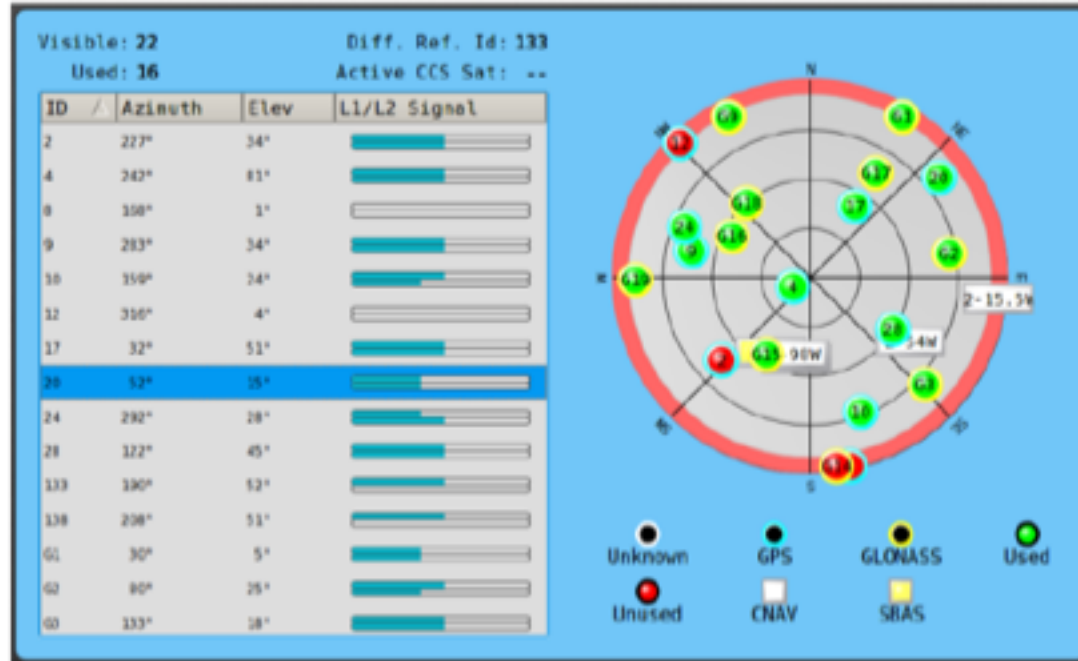
Center	Track Current		
Latitude	30°11.92802'	N	DD MM.ss
Longitude	092°00.05728'	W	DD MM.ss
Auto Range	Yes		
Range	00001.00		Meters
Labels	None		

OK Cancel

Enter the *Range* for the graph in the *Range* field. The display can also be set to automatically adjust the range of the graph if *Auto Range* is set to “Yes”. The operator can also choose to display distance labels on the graph.

Satellite Info

This screen provides the operator with information about the constellation configuration and the signal strengths received from each visible satellite. Relative locations of the GNSS satellites to the GNSS receiver are plotted based on azimuth and elevation information provided by the GNSS receiver. The plot includes corrections satellite information. Additionally, the receiver's current elevation mask is annotated on the plot.



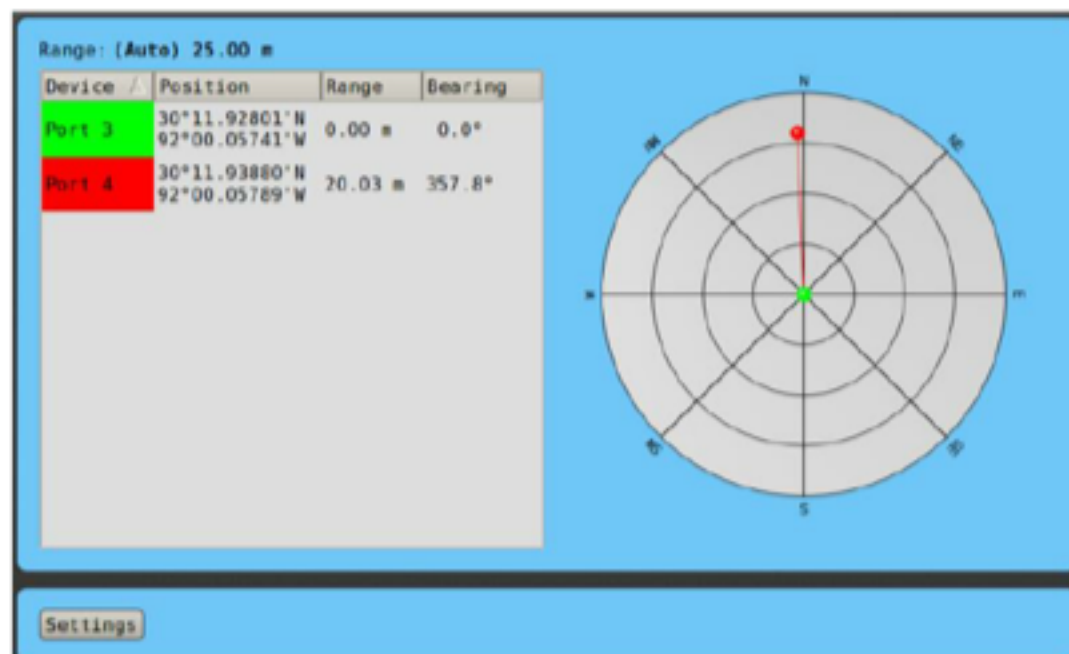
Each visible satellite is represented in the plot by a circle with the satellite ID number inside. All satellites used to compute the PVT solution are identified with green circles. Circles turn red if data from the satellite becomes too noisy or obstructed.

Circles with a blue border represent GPS satellites and those with a yellow border represent GLONASS satellites.

The graphic center point reference represents a point directly overhead and the grid lines from the center of the graph inversely indicate satellite elevation. There is a circle every 15 degrees of elevation and azimuth lines at every 45 degrees.

Position Comparison

The Position Comparison Plot shows the relative range and bearing between the active device and all other devices connected to the C-NaviGator III.



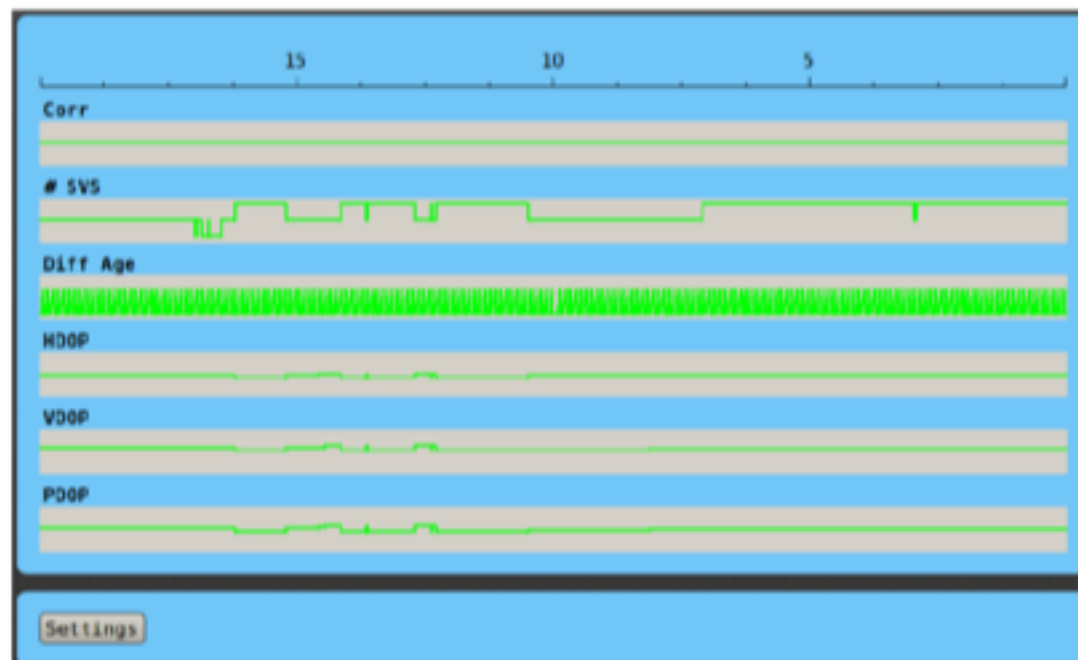
Position Comparison Settings

Allows the user to set the range of the graph or set it to auto range. When auto range is selected, the range will grow to accommodate the largest range between the reference device and any other device. The operator can also choose to display distance labels on the graph.



Graphs

Quality information for the previous 30 minutes is displayed in graphs. The colors change based on the quality alert settings.



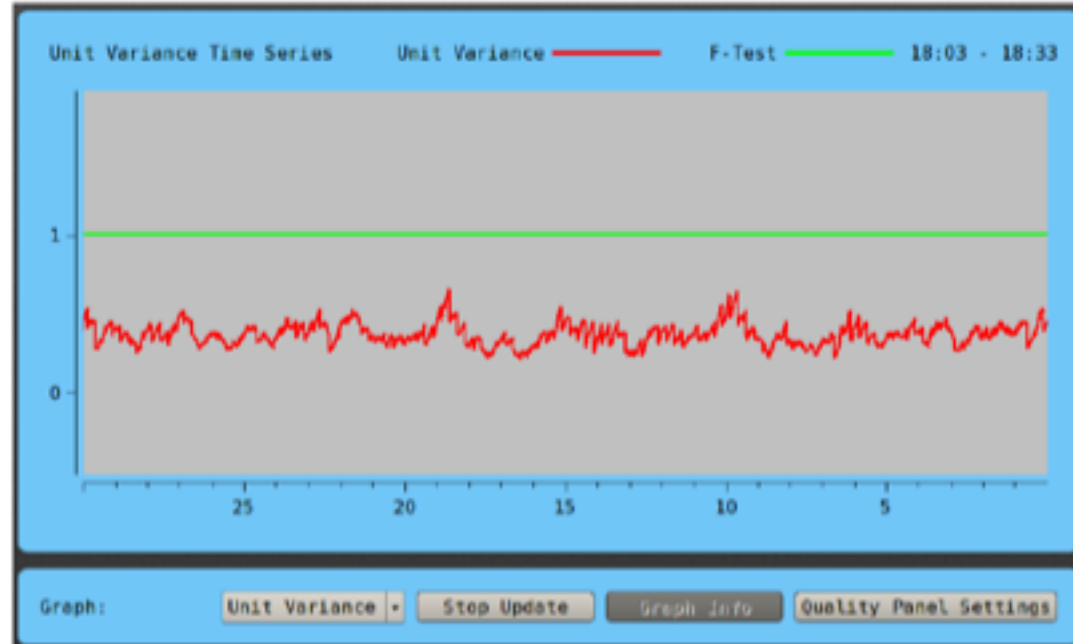
Graphs Settings

Allows the user to select up to 6 Graphs to display. The user can choose from any of the [Quality Panel Thresholds](#) (Page 32).



QC Graphs

The QC Graphs screen displays several graphs showing UKOOA compatible quality assurance data over time (1800 seconds / 30 minutes), if the active device provides that data. The *Graph* drop-down menu at the bottom of the screen allows selection of which graph is currently shown. The **Stop Update / Start Update**



button allows the continuous update of the graphs to be started or stopped. If the currently selected graph has extra information to display, the **Graph Info** button will bring up a screen with this information.

QC Settings

The QC Settings screen allows you to configure the quality thresholds used to qualify the QA/QC data as displayed in the QC Graphs and the QA/QC Status mode of the Quality Panel.



Band	Semi Major Axis	MDE(r)
1	05.00	20.00
2	03.00	10.00
3	02.00	05.00
4	01.00	02.00
5	00.50	01.00

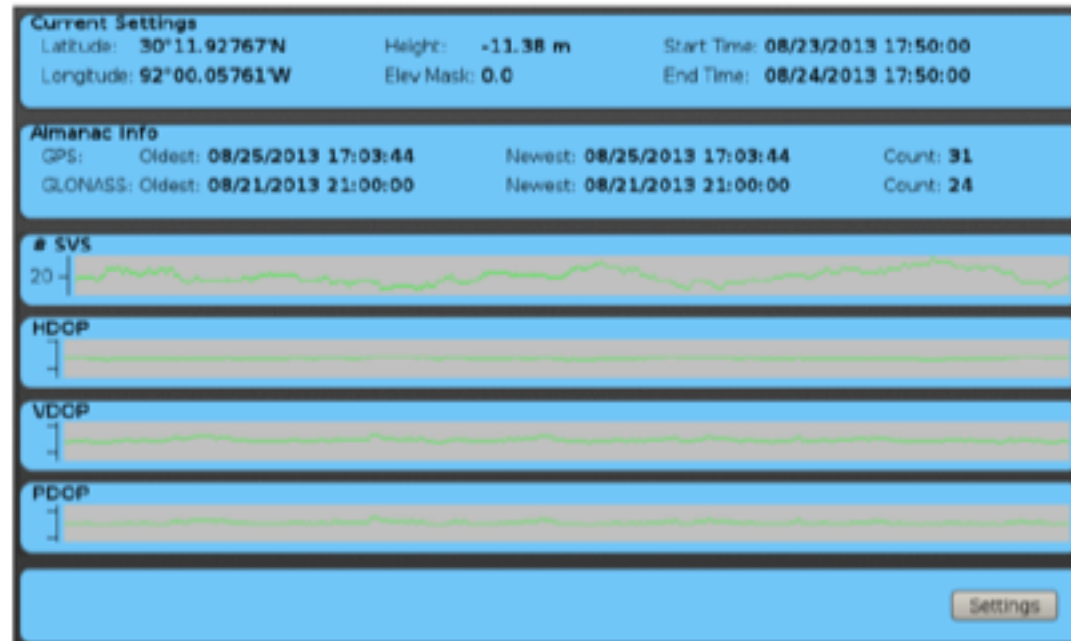
Unit Variance Thresholds:
 Warn (band 3): 02.0
 Bad (band 1): 05.0

Aspect Ratio Precision Penalty:
 Bands Lower: 1, 2
 Ratio: 01.5, 02.0

Pressing the **For SBAS,RTCM** or **For CCS,RTK** button will populate the fields with default values appropriate for the different expected navigation modes.

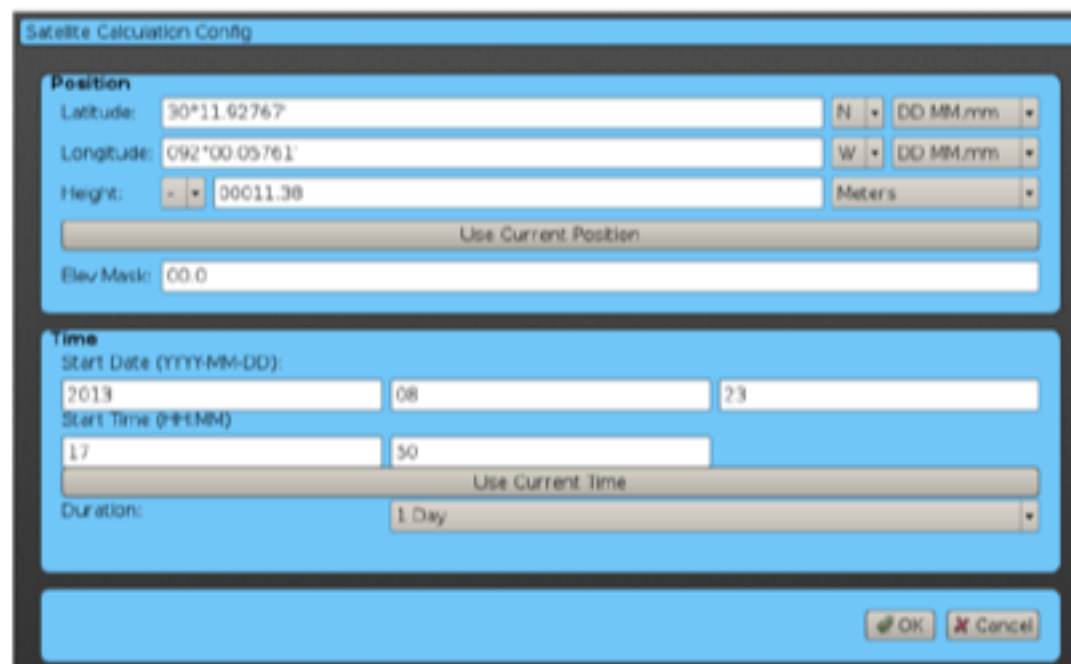
Satellite Calculations

The Satellite Calculations screen displays graphs showing several characteristics of the available GPS and GLONASS satellites over time. The top part of the screen displays the parameters used to perform the calculations as well as a summary of the available almanac data.



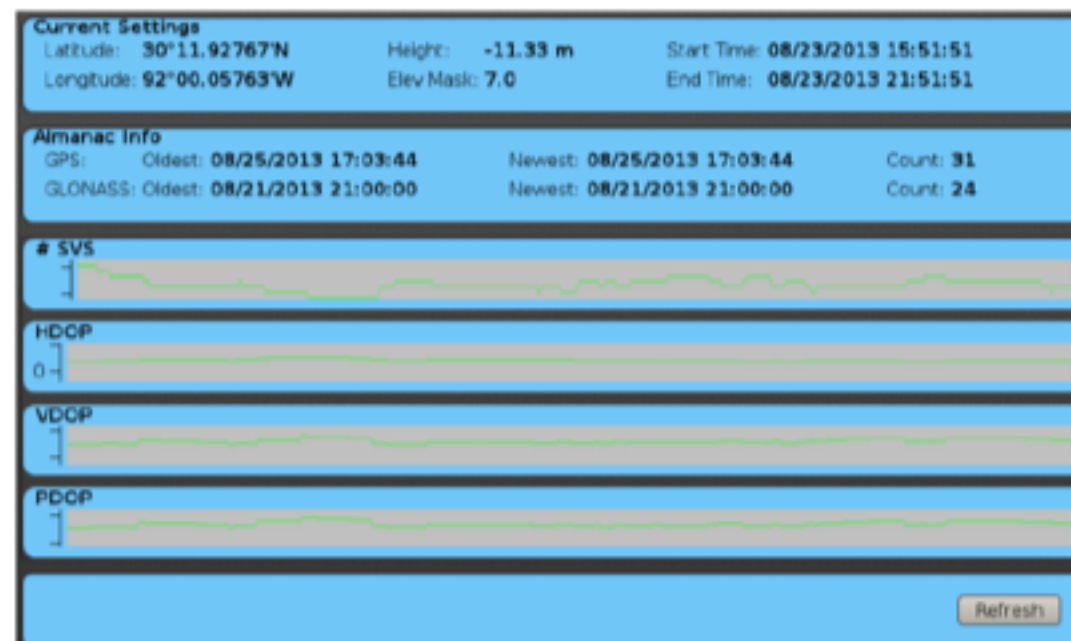
Satellite Calculations Settings

Allows the user to configure the parameters used in the calculations. The **Use Current Position** button will use the latest position from the active device if position data is available. The **Use Current Time** button will use the latest time from the active device if available. The graphs can display either 1 day's or 1 week's worth of data by setting the *Duration*.



Satellite Forecast

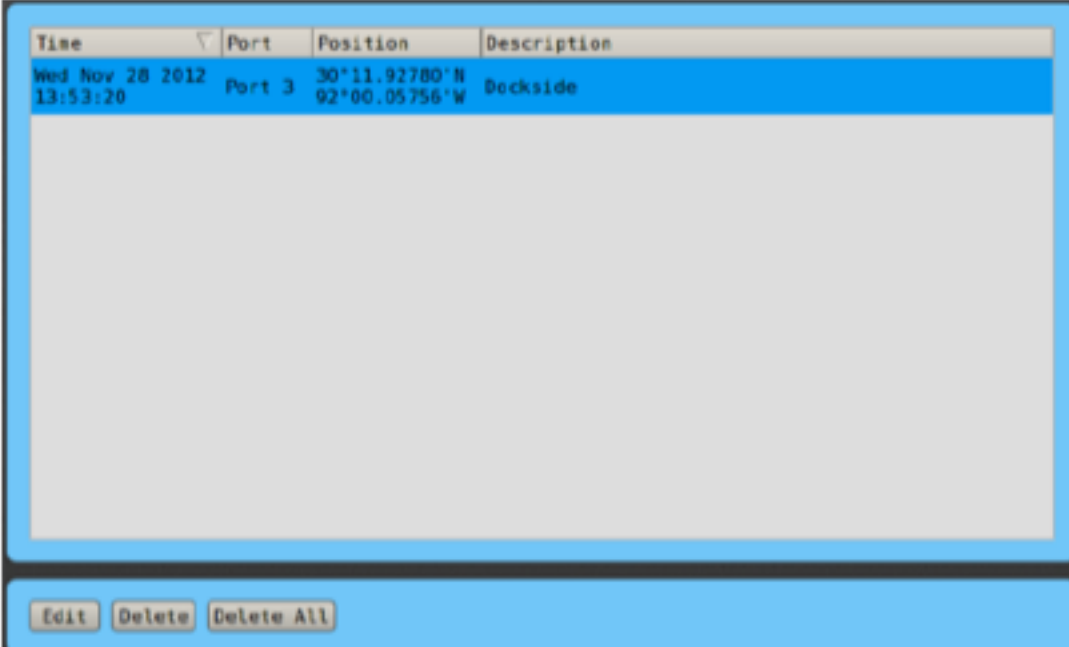
The Satellite Forecast page displays graphs showing several characteristics of the available GPS and GLONASS satellites over a time interval from two hours in the past to four hours in the future. The top part of the screen displays the parameters used to perform the forecast as well as a summary of the available almanac data.



The forecast parameters are taken from the characteristics of the active device. The forecast automatically updates every five minutes.

Fixes

Position fixes are logged into the C-NaviGator III memory when the **Take Fix** button is pressed. The **Edit** button allows the user to name / describe the fix.

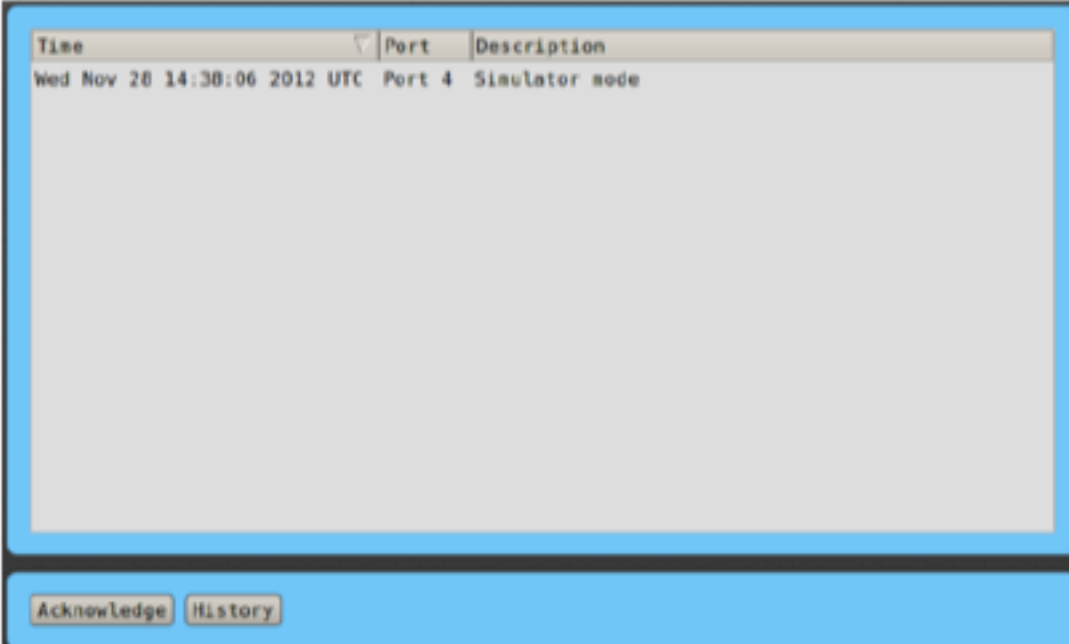


Time	Port	Position	Description
Wed Nov 28 2012 13:53:20	Port 3	30°11.92780'N 92°00.05756'W	Deckside

Alarms

Several alarm conditions are logged and displayed on this screen. The **Ack** button can be used to turn off the alarm indicator in the lower right corner of the display until a new alarm is raised.

Certain more serious alarms will continuously cause the alarm indicator to light up.

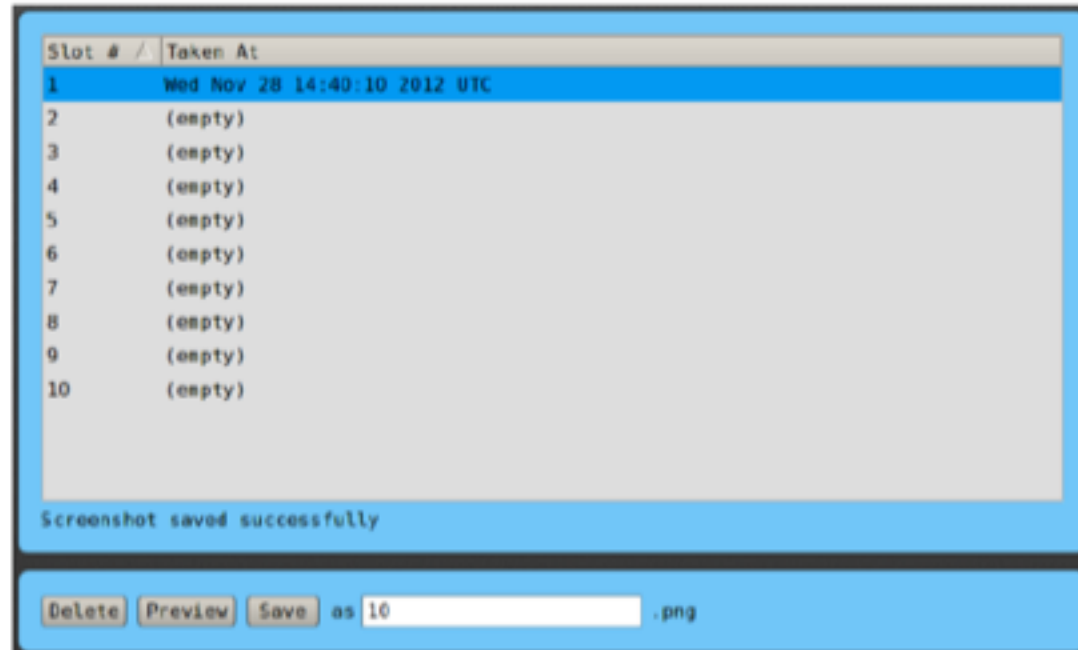


Time	Port	Description
Wed Nov 28 14:38:06 2012 UTC	Port 4	Simulator mode

See [Appendix E - Alarm List](#) (Page 92) for a detailed list of available alarms.

Screenshots

From this screen, the operator can preview existing screenshots. Images can be copied to USB devices. Screenshots in the list can be deleted. To preview a screenshot, select it in the list and press **Preview**. To copy one to a USB device, select the screenshot in the list and choose a USB device, then press **Save**.



Settings

General Settings

Two major system settings are accessed through this screen. These include:

Set Time Zone Offset

The offset from UTC time is set here by adjusting the hour and minute values.

Units

Distance, speed, and latitude / longitude units used for the C-NaviGator III displays are selected in this section of the screen.



Display Settings

Brightness of the C-NaviGator III LCD backlight and screen colors is controlled through settings on this screen. It can be adjusted for optimum viewing depending on the time of day and physical location of the unit. Night mode settings are necessary for installations on the bridge of a vessel where bright lights interfere with the helmsman's view.



Display Mode

This option selects the “Day” or “Night” color palette and backlight levels. The “Night” palette is much darker than the “Day” palette.

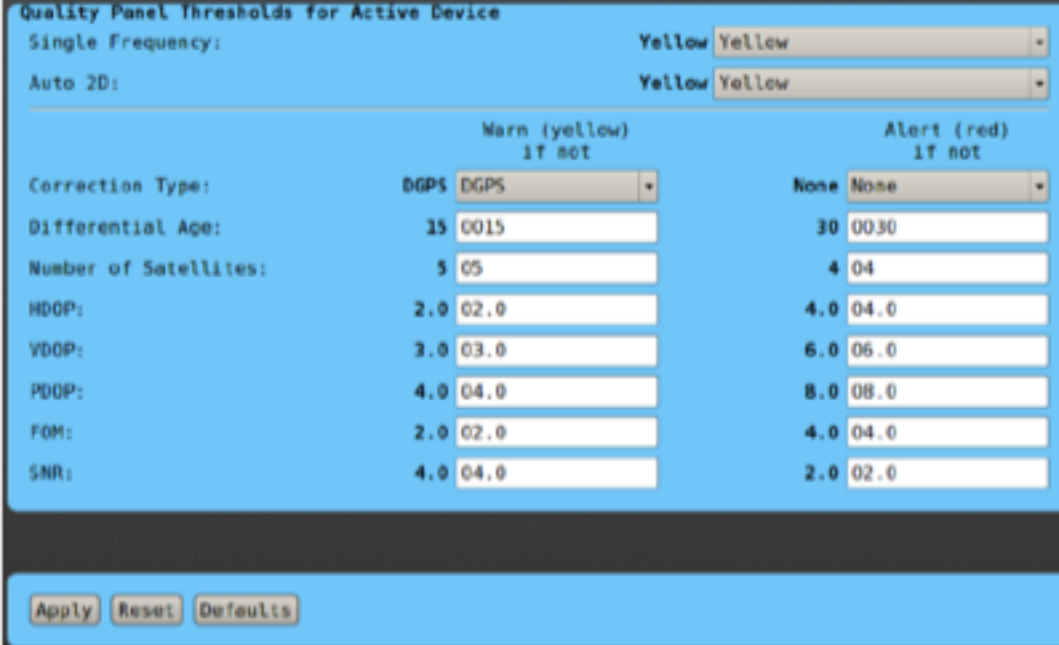
Auto Mode Settings

Programs the display to automatically switch between “Day” and “Night” modes. *Day Start Time* and *Night Start Time* can be configured in 15 minute increments.

Quality Panel Thresholds

The pane on the right side of the screen displays various GNSS quality figures that are color coded based on user-configurable limits. Red indicates that the data or status of the parameter is out of the acceptable range selected by the user.

Similarly, yellow indicates that the value being displayed is in the range that is borderline or requires attention. A green indicator signifies that the value or status of the parameter is within the acceptable limits.

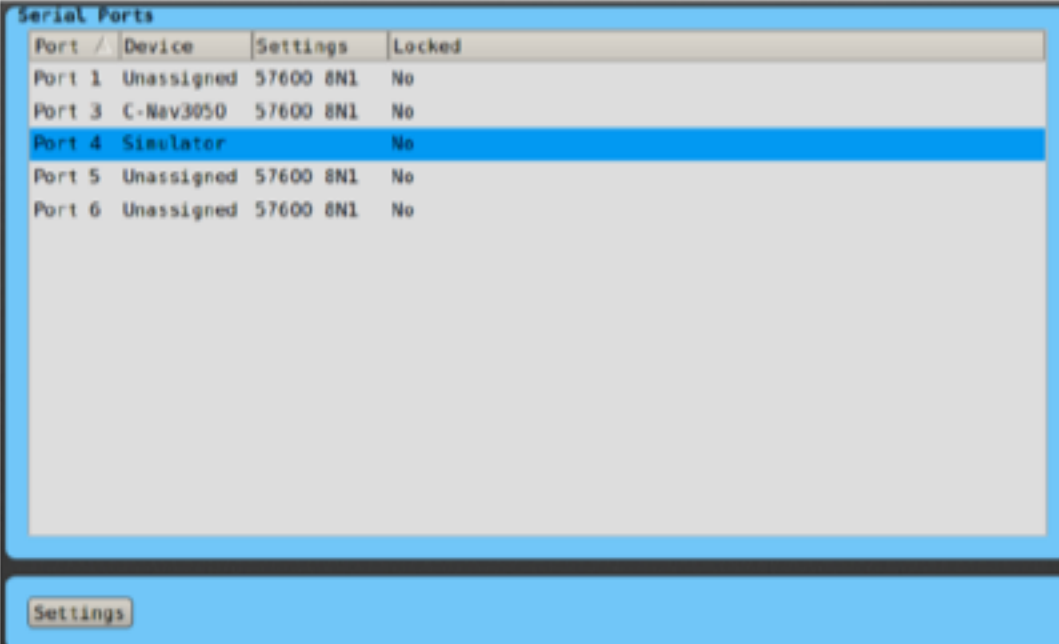


Correction Type:	Warn (yellow) if not		Alert (red) if not	
	DGPS	DGPS	None	None
Single Frequency:	Yellow		Yellow	
Auto 2D:	Yellow		Yellow	
Differential Age:	15	0015	30	0030
Number of Satellites:	5	05	4	04
HDOP:	2.0	02.0	4.0	04.0
VDOP:	3.0	03.0	6.0	06.0
PDOP:	4.0	04.0	8.0	08.0
FOM:	2.0	02.0	4.0	04.0
SNR:	4.0	04.0	2.0	02.0

The **Menu / Settings / Quality Panel Thresholds** screen allows you to configure when the quality indicators change colors. “Single Frequency” and “Auto 2D” positioning may or may not indicate a problem, depending on the situation. So, you can select any of the colors for these states. For the rest of the alerts, you have two columns of settings. In the *Warn (Yellow) if not* column, you select at what point the indicator turns from green to yellow. In the *Alert (Red) if not* column, you select at what point the indicator turns from yellow to red.

Serial Ports

This screen allows the operator to assign input / output devices to the desired ports. Each port is activated by selecting a device in the *Device* column and pressing the **Settings** button. Also adjustable are the serial data transfer settings, including *Baud Rate* (speed), number of *Data Bits*, *Parity* and the number of *Stop Bits*. Always press **OK** after all changes are made.



Port	Device	Settings	Locked
Port 1	Unassigned	57600 8N1	No
Port 3	C-Nav3050	57600 8N1	No
Port 4	Simulator		No
Port 5	Unassigned	57600 8N1	No
Port 6	Unassigned	57600 8N1	No

Note:

For C-Nav2000 and C-Nav2050, factory default communication settings are 19200 / 8 / None / 1

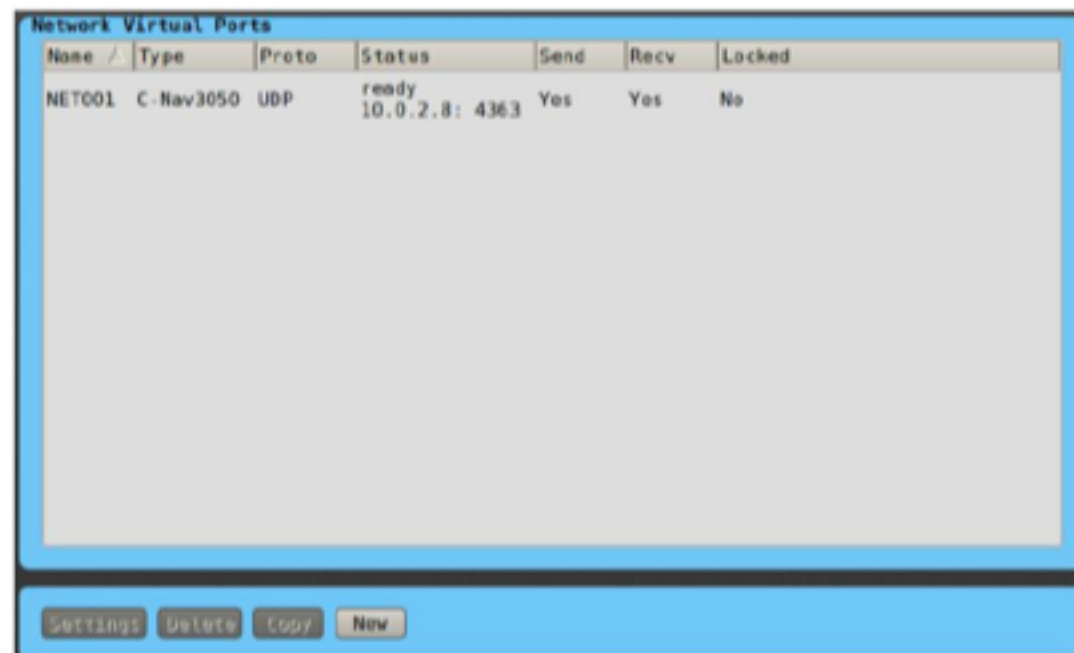
For C-Nav1010 and C-Nav3050, factory default communication settings are 57600 / 8 / None / 1

All of the C-NaviGator III active are listed below **Menu / Settings / Serial Ports**. In the example above, *Port 3* is set to “C-Nav3050”. Additional device status, settings and control information are available for each port when selected.

Network Virtual Ports

This screen shows the network virtual port summary and allows the operator to configure network connections. Press the **New** button to create a new network device connection. Use the **Settings** to show details of an existing network device connection. To copy an existing configuration, press the **Copy** button.

Pressing **Delete** will remove a network device connection.

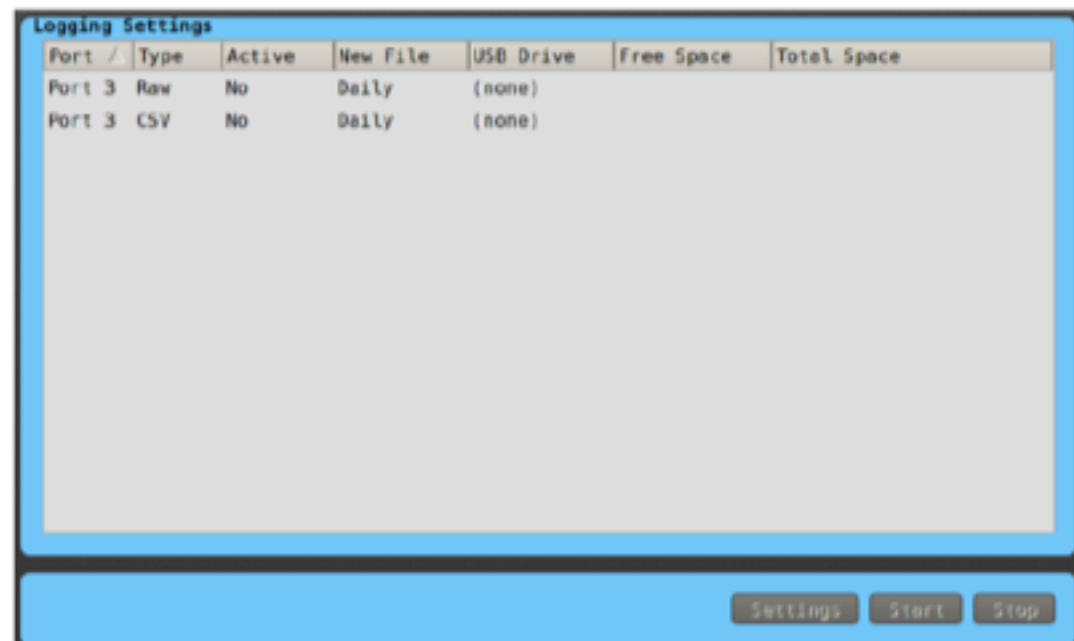


Name	Type	Proto	Status	Send	Recv	Locked
NET001	C-Nav3050	UDP	ready 10.0.2.8: 4363	Yes	Yes	No

Buttons: Settings, Delete, Copy, New

Logging

This screen allows the operator to configure logging of the data from an input device to a USB mass storage device. Each port can be configured to log input data. Select the “Raw” port from the list, and press the **Settings** button. On the logging settings dialog select the frequency to create new files, and the USB device to place

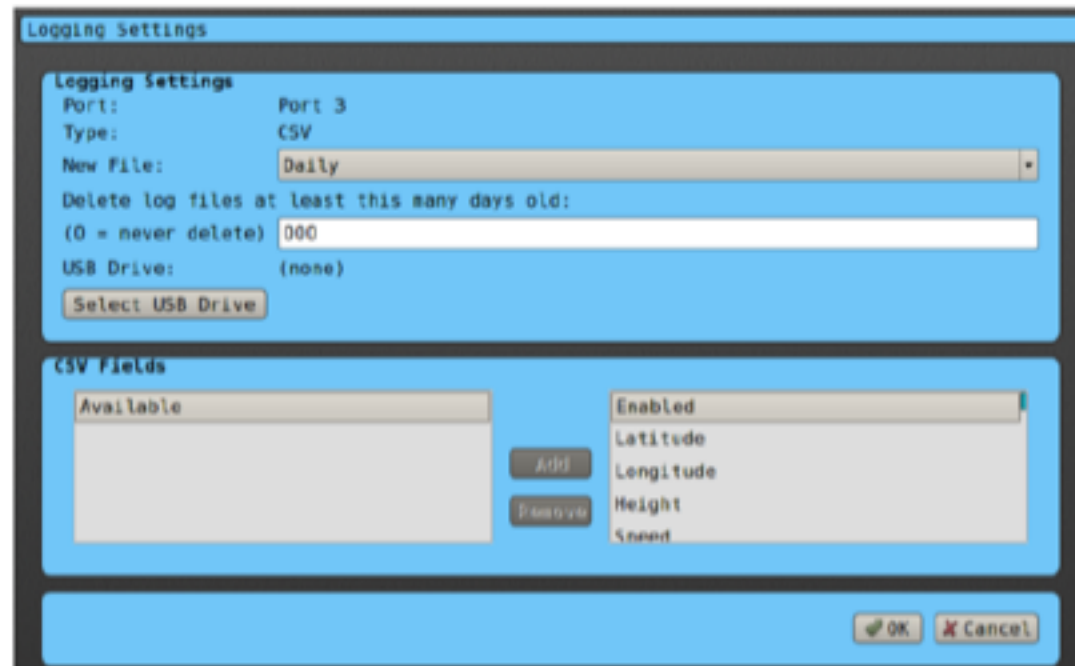


Port	Type	Active	New File	USB Drive	Free Space	Total Space
Port 3	Raw	No	Daily	(none)		
Port 3	CSV	No	Daily	(none)		

Buttons: Settings, Start, Stop

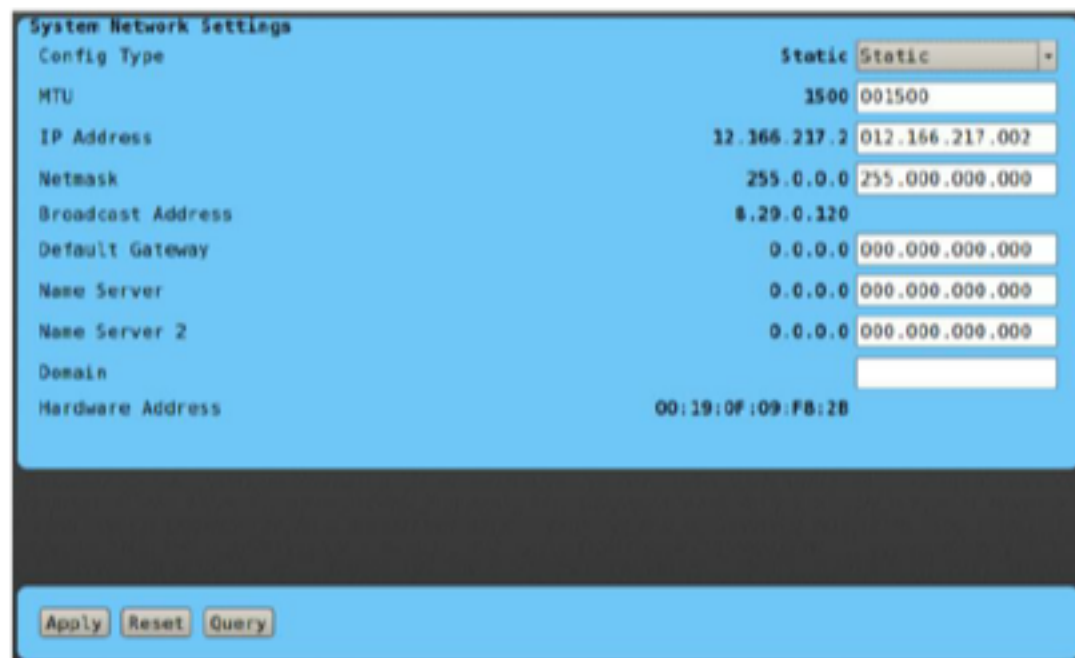
the files. Once configured, you can use the **Start** and **Stop** buttons to control data logging.

C-Nav receivers are also capable of logging a to a human-readable CSV format. Select the “CSV” port from the list and press the **Settings** button. Aside from the normal logging settings, which fields are logged can be configured from this screen. Once configured, you can use the **Start** and **Stop** buttons to control logging.



System Network Settings

This screen allows the operator to networking configuration for the unit. Choose the *Config Type* “DHCP”, “Static” or “Disabled”. Provide settings from your network administrator, and press the **Apply** button.

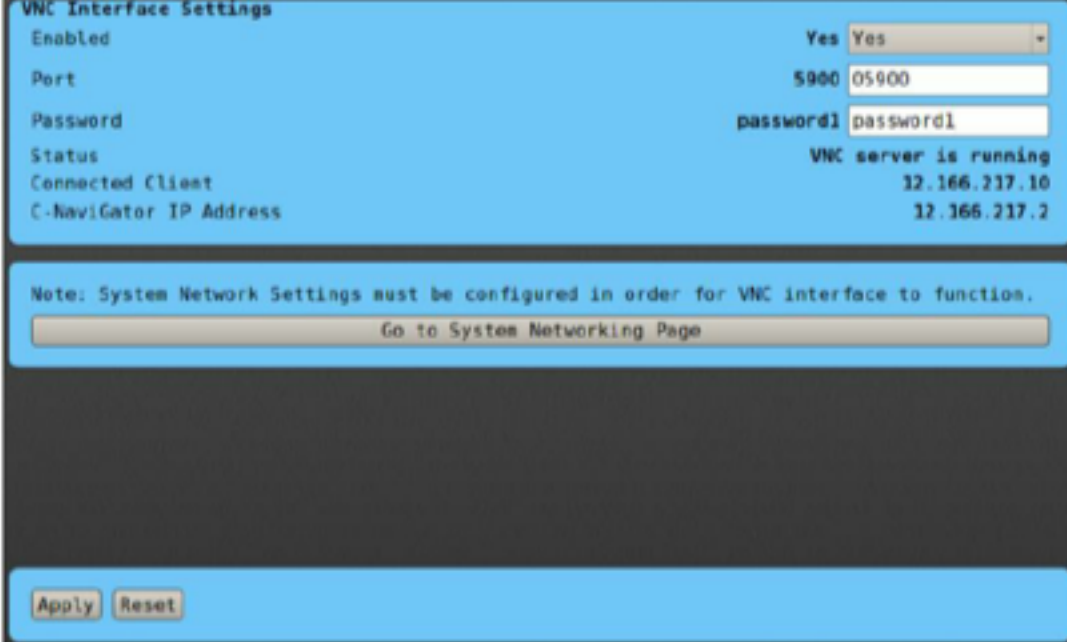


Parameter	Value
Config Type	Static
MTU	3500
IP Address	12.166.217.2
Netmask	255.0.0.0
Broadcast Address	8.29.0.120
Default Gateway	0.0.0.0
Name Server	0.0.0.0
Name Server 2	0.0.0.0
Domain	
Hardware Address	00:19:0F:09:FB:2B

VNC Interface

This screen allows the operator to configure the VNC server. Once configured, VNC clients can connect and control the C-NaviGator III.

System networking must be configured in order for VNC to function.



VNC Interface Settings	
Enabled	Yes Yes
Port	5900 05000
Password	password1 password1
Status	VNC server is running
Connected Client	12.166.217.10
C-NaviGator IP Address	12.166.217.2

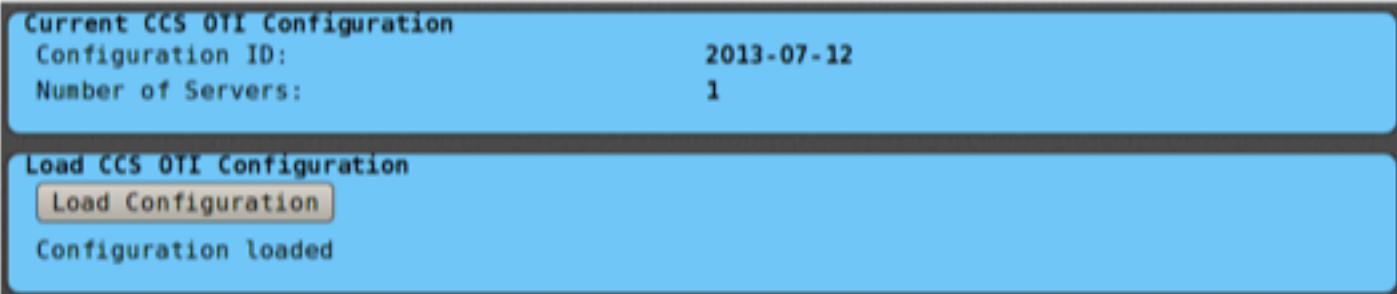
Note: System Network Settings must be configured in order for VNC interface to function.

[Go to System Networking Page](#)

Apply Reset

CCS OTI Configuration

This page allows for the configuration of the information necessary for supporting receivers (currently only the C-Nav3050) to receive CCS corrections over the Internet.



Current CCS OTI Configuration	
Configuration ID:	2013-07-12
Number of Servers:	1

Load CCS OTI Configuration

[Load Configuration](#)

Configuration loaded

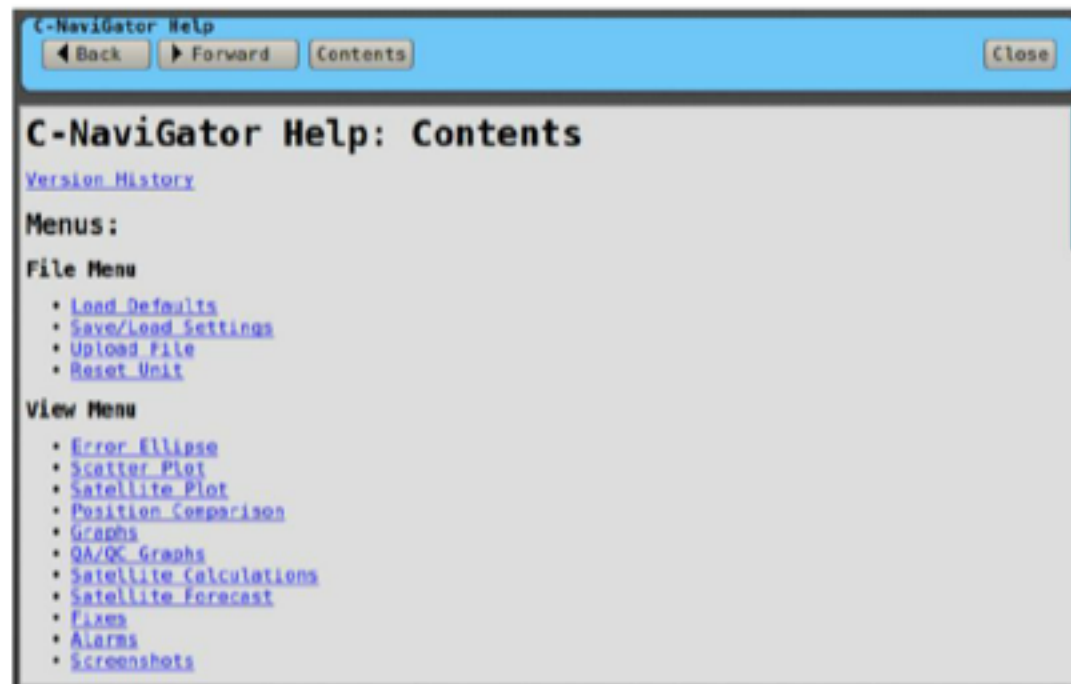
Press the **Load Configuration** button to upload a new CCS OTI configuration file from a USB mass storage device.

To learn more about configuring the C-Nav3050 to use CCS OTI, please see the C-Nav3050 CCS OTI Manual.

Help

Contents

Under **Menu / Help**, the operator can also find the latest information relating to other menu items. The information here is similar to that presented in this manual.

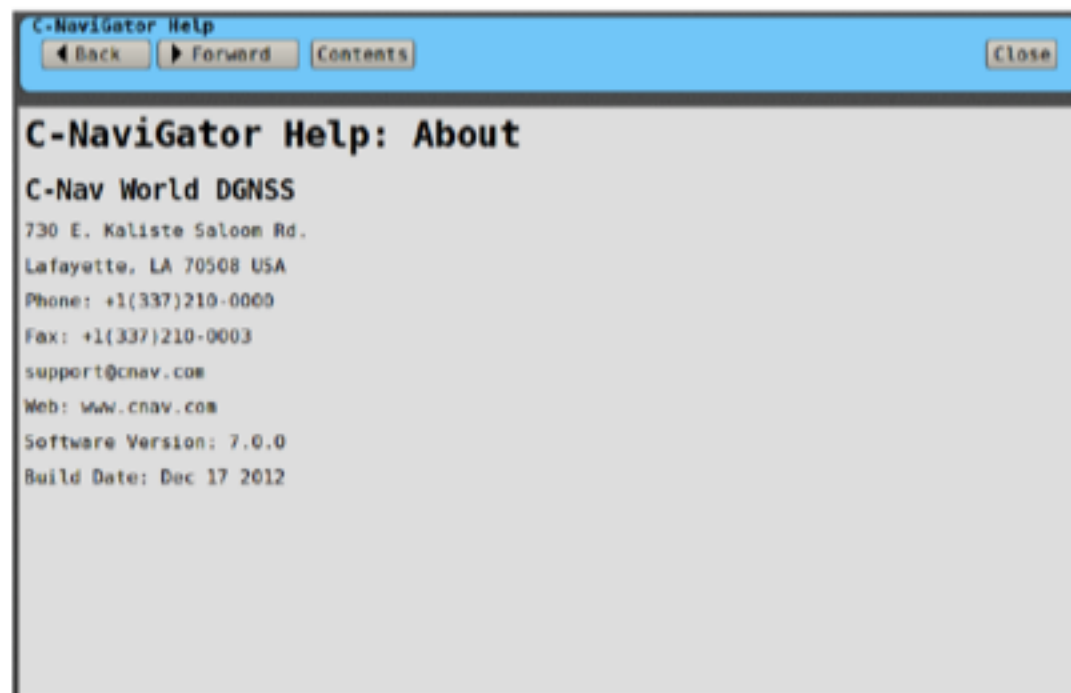


This Page

As an operator aid, **Menu / Help / This Page** contains information about the screen currently displayed. It provides a quick reference should there be a question that requires a quick answer.

About

Support contact information from C & C Technologies can be found by selecting **Menu / Help / About** menu. There you will find the current version number, contact information, etc. to assist the operator should problems arise.



Section 4 - Devices

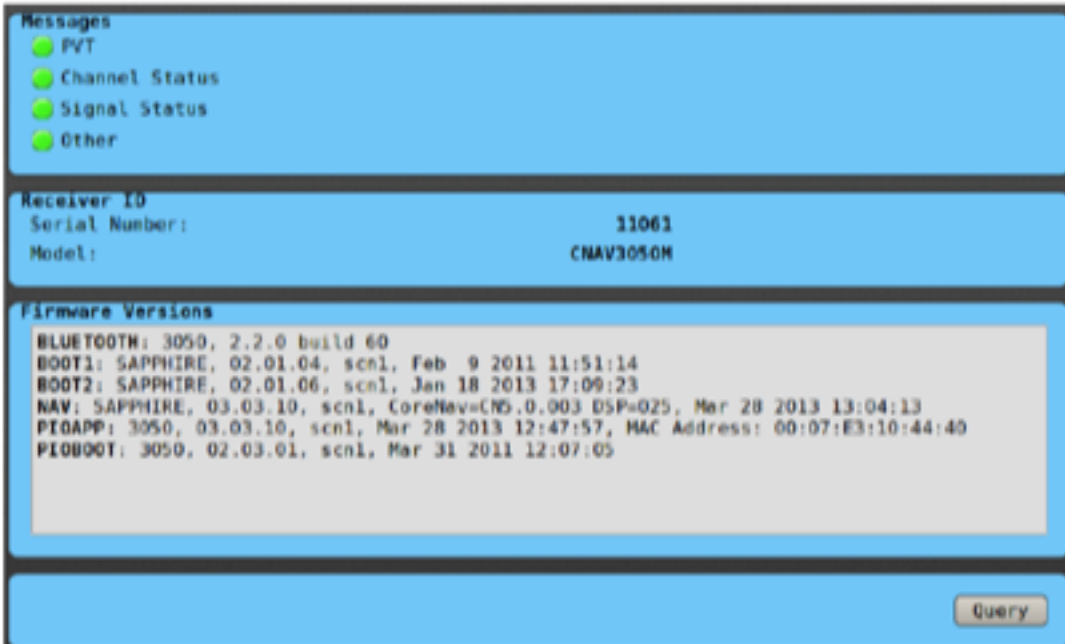
This section describes the available device drivers and their use.

C-Nav3050

Receiver Information

General information about the C-Nav3050 GNSS receiver (such as firmware / hardware versions, serial numbers, etc.) is displayed on this screen. Message indicators (green / grey circles) indicate when data messages are received.

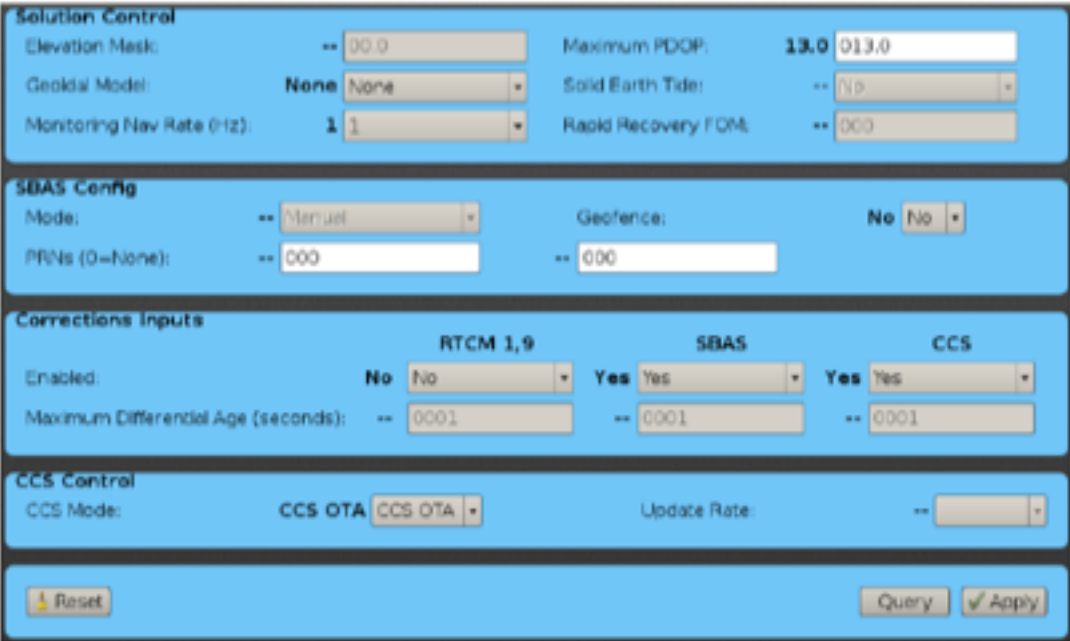
The **Query** button can be used to request updated information from the receiver.



Solution Control

Control settings relevant to computing the position are displayed on this screen. The user can configure the use of corrections.

To learn more about configuring the C-Nav3050 to use CCS OTI, please read the C-Nav3050 CCS OTI manual available on our website.



Corrections Authorization

Current license information is displayed here and authorization codes can also be entered here.

Authorization Information	
Serial Number	13709
License 1 of 1	
Active Status	Active
CCS License Type	Precise
Expiration Type	Calendar
Issue Date	Wed Nov 28 15:06:59 2012 UTC
Start Date	Wed Nov 28 00:00:00 2012 UTC
End Date	Fri Dec 7 23:59:59 2012 UTC
Region Code	8000 (All Regions)
Network Authorization	All
Cancel Verify Code(s)	DAB14E05-AA7A5BF4-01186C9A-9885EF8E BD9B4F24-124C16C9-580F498D-92255185
Change Authorization	
Enter Authorization/Cancel Code	
<input type="text" value="00000000-00000000-00000000-00000000"/>	
<input type="button" value="Read Code From File"/>	
<input type="button" value="Apply"/> <input type="button" value="Cancel All"/> <input type="button" value="Show Next"/> <input type="button" value="Query"/>	

Software Options

The options available to the user are encoded into and activated by the *Options Code*. This determines which settings and features are enabled in the system.

Frequency Options L1: Yes L2: Yes L2C: Yes L5: Yes G1: Yes G2: Yes	Corrections Options CCS: Yes SBAS: Yes RTK Base: Yes RTK Moving Base: Yes RTK Rover: Yes RTK Extend: Yes
General Options Navigation Rate: 25 Data Rate: 25	IPPS Event Latch: Yes CCS OTI: Yes
Activate Software Options Enter Options Code: <input type="text" value="00000000-00000000-00000000-00000000"/>	
Geo Fencing Information Point: 1 of 1 Radius (km): 2 Latitude: 30°00.00000'N Longitude: 80°00.00000'W <input type="button" value="Next Point"/>	
<input type="button" value="Query"/> <input checked="" type="button" value="Apply"/>	

Corrections Receiver

This screen contains status indicators relative to GNSS corrections received.

DownLink Status	
Signal Status	Locked
Signal to Noise Ratio	8.90
Packets Percent Idle	15.34%
Packets Percent Bad	7.34%
Resync Count	35
<input type="button" value="Query"/> <input type="button" value="Settings"/>	

Corrections Receiver Settings

This screen contains settings related to the usage of CCS corrections including: *Network Priority*, *Correction Mode*, *CCS Almanac*, and the *Current CCS satellite Selection*.

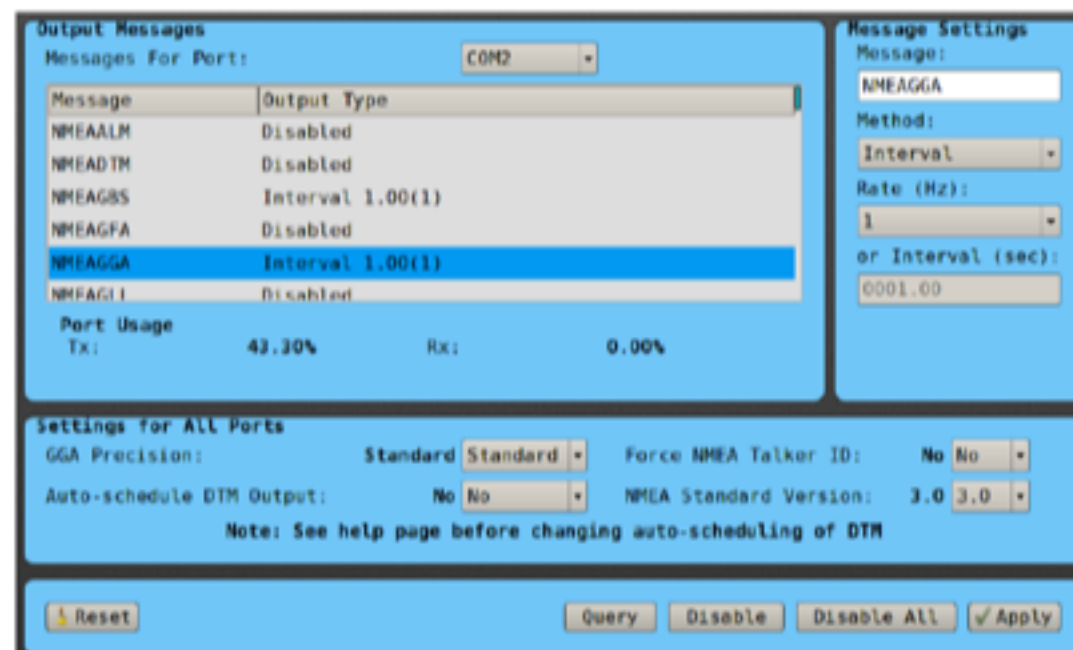


The screenshot shows the 'Corrections Receiver Settings' interface. It includes sections for 'Satellite Selection' (Network Priority: Default, Current Selection: 446, Auto-Select: No), 'Available Satellites' (table with columns ID, Longitude, Look Angle, Net, Attributes), 'Corrections Use' (Corrections Mode: Both), and 'CCS Almanac' (New Almanac Available: No, Switch Policy: Automatic, Auto-switch After: 00:00). Buttons for 'Reset', 'Status', and 'Apply' are at the bottom.

ID	Longitude	Look Angle	Net	Attributes
402	98.0W	54	1	
446	54.0W	35	2	A

Output Control

Output data strings from the C-Nav3050 can be chosen by the settings in this screen. Some messages can be output on change, thus output at the navigation rate. Other strings can be set to output every "Fixed" number of seconds. Settings that affect the type of NMEA messages output are also set from this screen.



The screenshot shows the 'Output Control' interface. It features a table for 'Output Messages' (Messages For Port: COM2) with columns Message and Output Type. A 'Message Settings' panel on the right allows configuration for NMEA messages like NMEAAGGA. 'Settings for All Ports' includes GGA Precision (Standard) and NMEA Standard Version (3.0). Buttons for 'Reset', 'Query', 'Disable', 'Disable All', and 'Apply' are at the bottom.

Message	Output Type
NMEAALM	Disabled
NREADTM	Disabled
NREAGBS	Interval 1.00(1)
NREAGFA	Disabled
NREAGGA	Interval 1.00(1)
NREAGLI	Disabled

Auxiliary Port Configuration

COM1 and COM2 on the C-Nav3050 receiver can be configured here. Serial data transfer parameters (*Baud Rate* and *Parity*) should be set to match that of the C-NaviGator III port.



The screenshot shows the 'Auxiliary Port Configuration' interface. It displays 'Port Configuration' (C-NaviGator: COM1, Auxiliary Serial: COM2) and 'Auxiliary Serial Port Configuration' for COM1. Parameters include Baud Rate (57600), Data Bits (8), Parity (None), Stop Bits (1), COM1 Power-On Message (Yes), and COM2 Serial Mode (RS-232). Buttons for 'Apply', 'Reset', and 'Query' are at the bottom.

1PPS Configuration

The user can modify settings for the 1PPS output from this screen.

1PPS Settings	
Polarity	Positive Positive ▾
Pulse Width (ns)	1000000 1000000
Interval (ns)	1000 01000
Signal Delay (ns)	0 00000
Chip Delay (ns)	0 000000

Apply Reset Query

RTK Configuration

Use this screen to adjust your RTK settings and MBRTK settings.

Moving Base RTK Configuration	
Extrapolate Baseline	Yes Yes ▾
Limit Inclination	Yes Yes ▾
Maximum Inclination (deg)	30.000 30.000
Fixed Baseline	No No ▾
Length (m)	-- 000.000
Tolerance (m rms)	-- 0.000
Antenna Alignment	Longitudinal Longitudinal ▾
User Angle	-- 000.00

Apply Reset Query RTK Settings

Differential Configuration

The RTCM (Radio Technical Commission for Maritime Services) standard SC-104 correction type and rates for the C-Nav3050 are implemented here.

Differential Mode			
Mode	Base - RTCM 1	Base - RTCM 1 ▾	Base Output Port COM2 COM2 ▾
Station/Site ID	1 0001	Wrapped (PACKB) Output	None None ▾
Dynamic Mode	Static	Static ▾	RTCM2 Input Version 2.3 2.3 ▾

Base Station Name
REF1
REF1

Base Station Position
Latitude 30°11.92832'N 30°11.92832' N ▾ DD MM.ss ▾
Longitude 92°00.05711'E 092°00.05711' W ▾ DD MM.ss ▾
Height -11.56 m ▾ 00011.56 Meters ▾

Self Survey
Samples -- Elapsed --
Start Stop

Apply Reset Query

Navigation Modes

This screen allows the user to configure the navigation modes for the C-Nav3050. The vertical navigation mode, which signals to use for measurements and the dynamic mode of the receiver, can be set here.

Vertical Navigation Mode			
2D/3D Mode	Auto <input type="text" value="Auto"/>		
2D Height (m)	-- <input type="text" value="00000.000"/>		
Navigation Measurement Use			
L1	Yes <input type="text" value="Yes"/>	L5	No <input type="text" value="No"/>
L2	Yes <input type="text" value="Yes"/>	GLONASS	Yes <input type="text" value="Yes"/>
L2C	No <input type="text" value="No"/>		
Note: See help page before changing these settings			
Dynamic Mode			
Overall Mode	Medium <input type="text" value="Medium"/>	CCS Mode	-- <input type="text" value="STATIC"/>
RTK Mode	-- <input type="text" value="STATIC"/>	Velocity Smoothing	-- <input type="text" value="No"/>
<input type="button" value="Apply"/> <input type="button" value="Reset"/> <input type="button" value="Query"/>			

Warning:
L1 measurement usage is critical to the operation of the receiver. It is not recommended that users turn off *L1* measurement usage. If *L1* is disabled, the receiver's behavior is undefined. Other measurement types will be disabled.

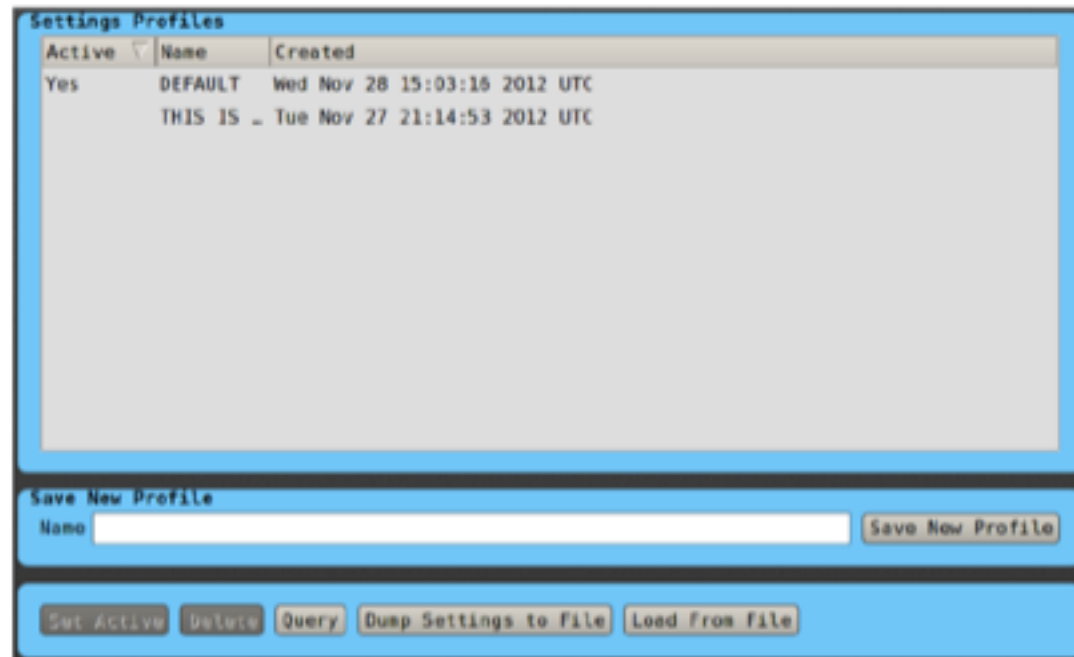
Antenna Information

Use this screen to adjust the *Phase Center Height*, *Slant Range*, and *Radius* of your antenna. The user can also define reference information for the antenna.

Antenna Identification			
Name	Part Antenna <input type="text" value="Part Antenna"/>		
Serial Number	11235	<input type="text" value="11235"/>	
Setup ID	255	<input type="text" value="255"/>	
Antenna Adjustments			
Use Adjustments	No <input type="text" value="No"/>		
Phase Center Height (mm)	0	<input type="text" value="000"/>	
Slant Range (mm)	0	<input type="text" value="00000"/>	
Radius (mm)	0	<input type="text" value="00000"/>	
<input type="button" value="Apply"/> <input type="button" value="Reset"/> <input type="button" value="Query"/>			

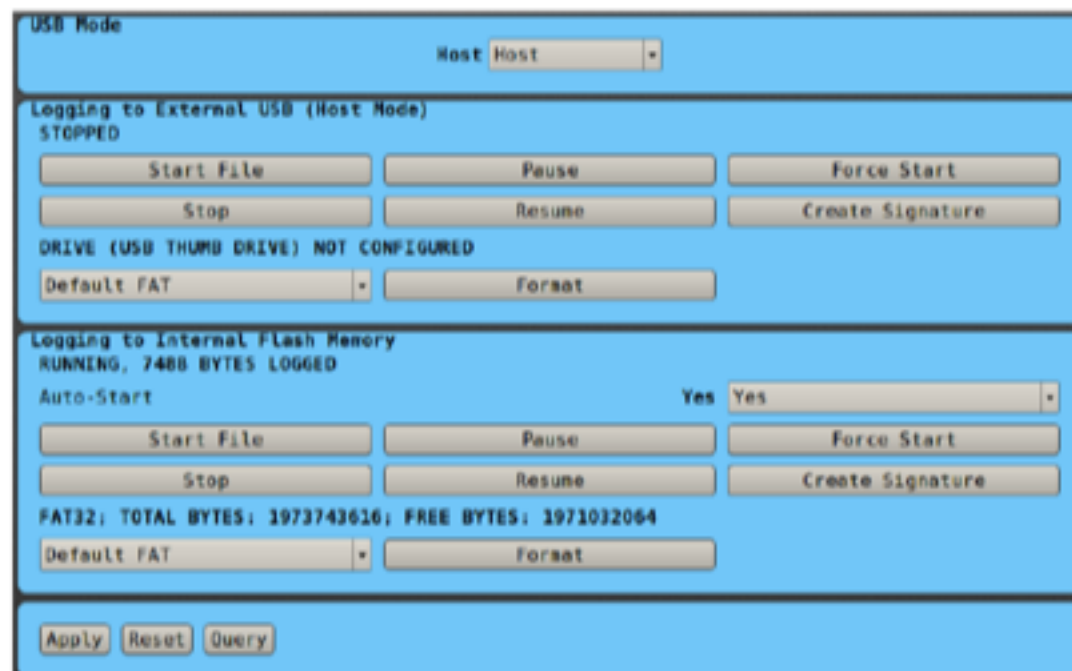
Settings Profile

Settings can be saved in the C-Nav3050. Use this screen to save and activate settings profiles within the receiver.



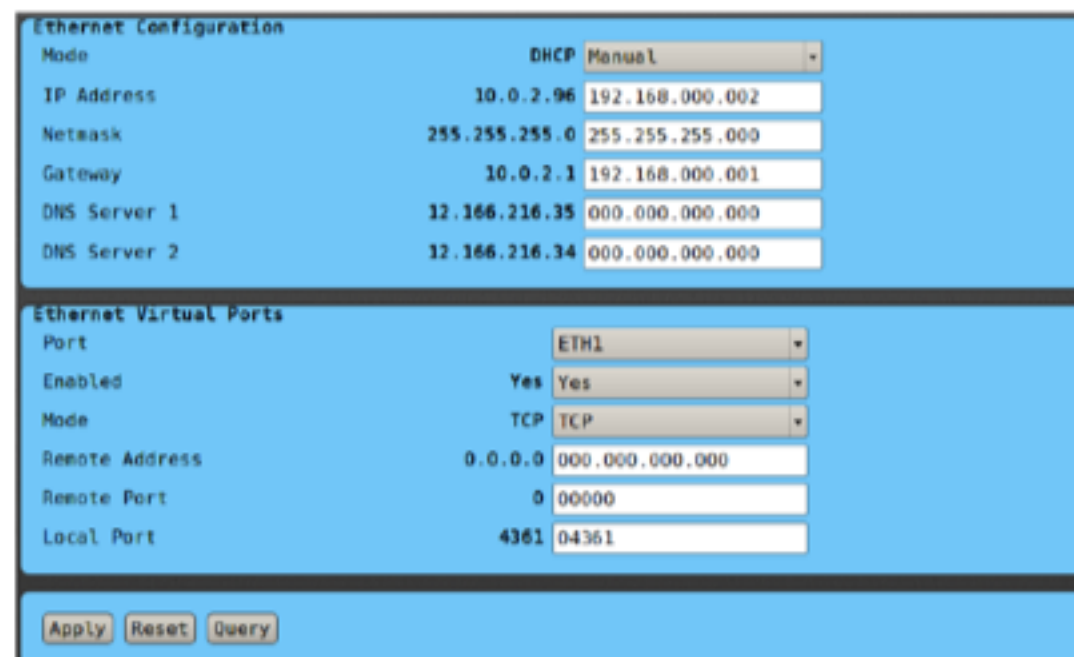
Hardware Settings

This screen allows the user to configure the USB mode, control logging to the internal memory and USB devices when in "Host" *USB Mode*.



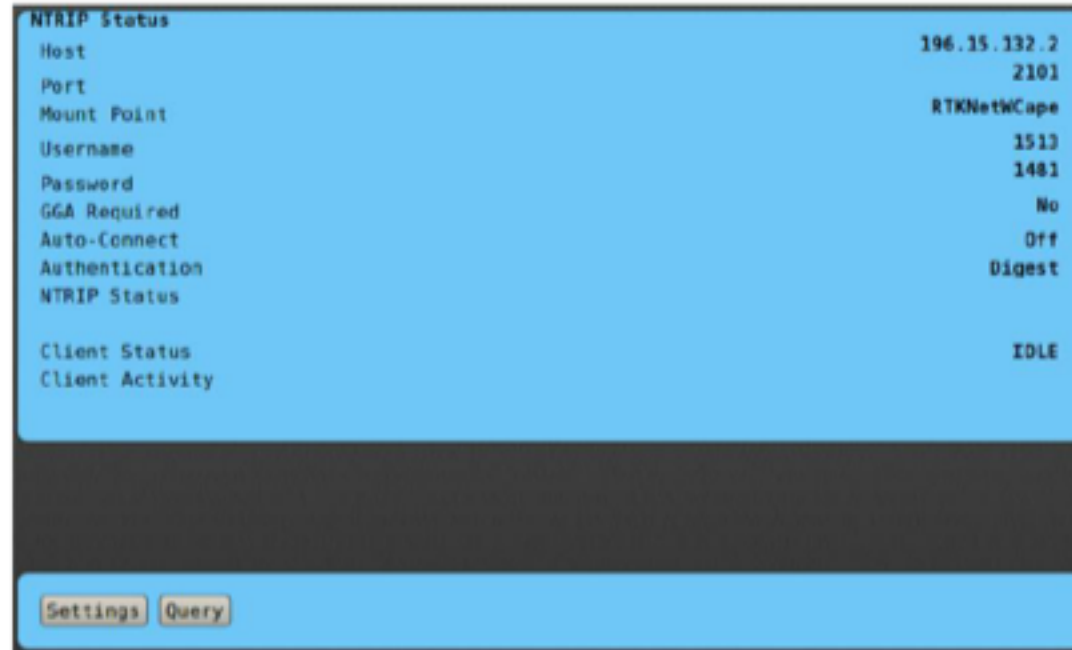
Ethernet Settings

This screen allows users to configure the network settings for the receiver's built-in Ethernet interface. The user can also configure the virtual ports to use for output or control.



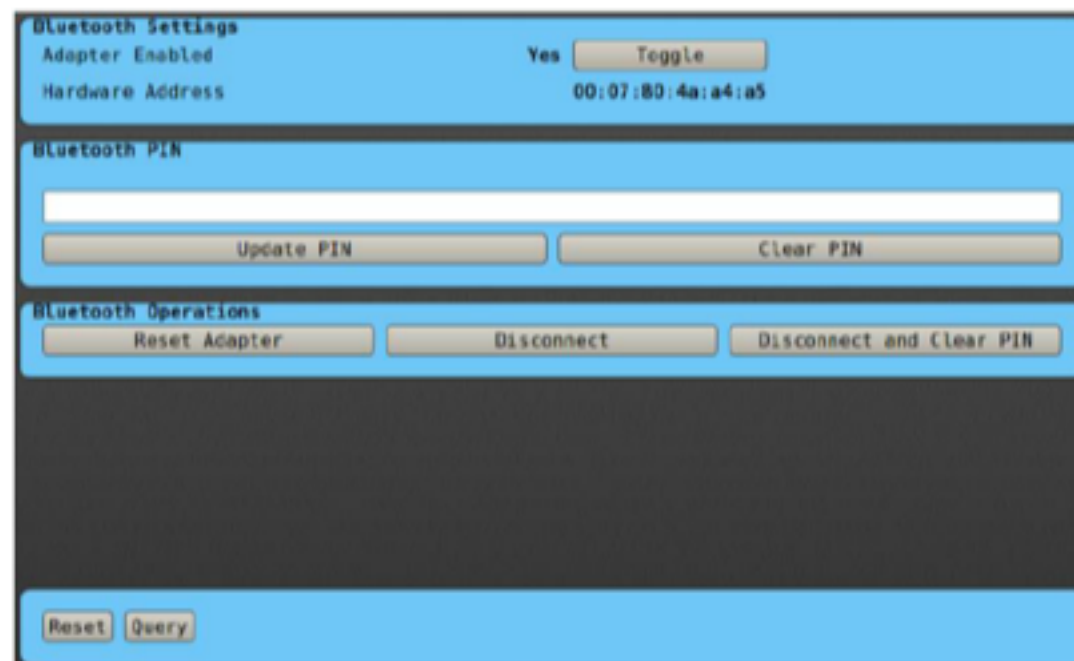
NTRIP Settings

This screen allows users to configure the settings for NTRIP input to the receiver.



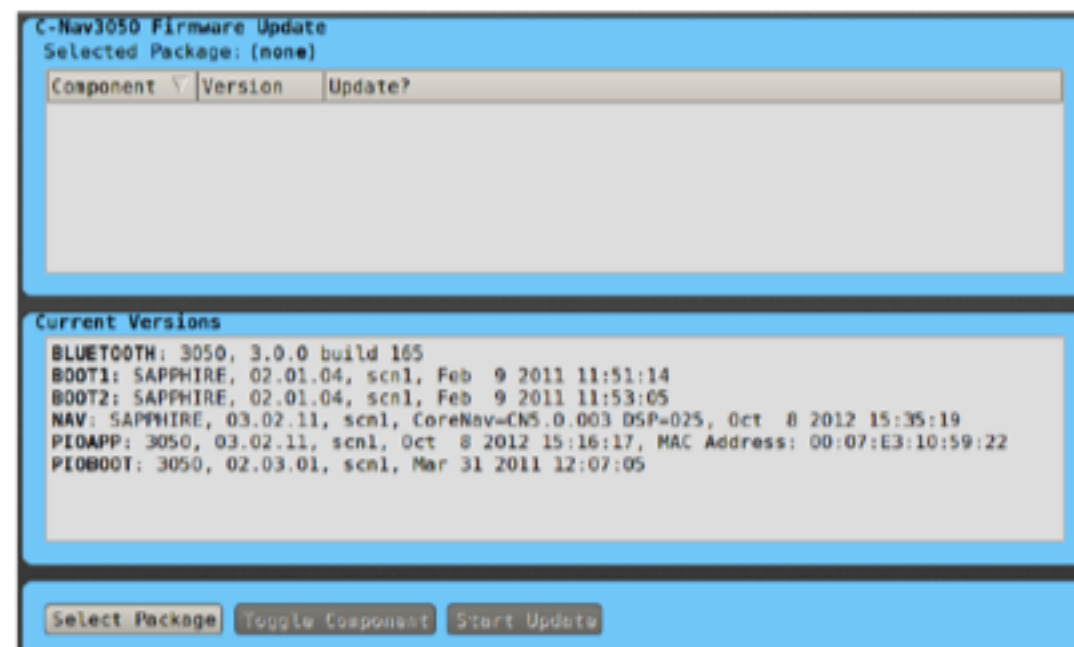
Bluetooth Settings

This screen allows you to configure the Bluetooth settings for the C-Nav3050.



Firmware Update

The C-Nav3050 receiver's firmware can be installed from this screen. Ensure that the USB memory device is installed. Press the **Select Package** button to search the USB memory stick for available firmware. You can toggle which components are updated by selecting the component and pressing the



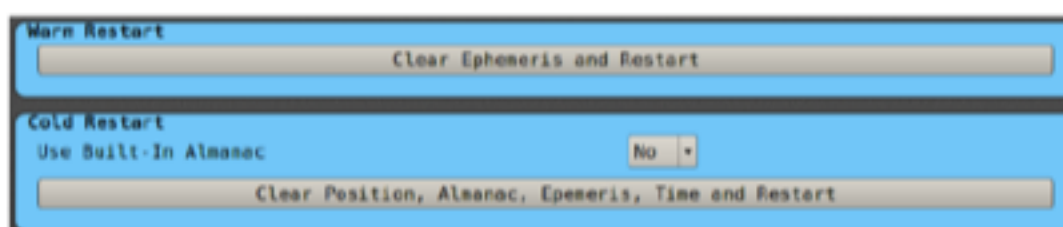
Toggle Component button. Press **Start Update** to upload the new code into C-Nav3050 memory. Information regarding the new version is displayed in the information window.

Warning:

Do not unplug the USB device while the memory is uploading.

Restart

Use this screen to restart your C-Nav3050.



C-Nav2050

Receiver Information

General information about the C-Nav2050 GPS receiver (such as firmware / hardware versions, serial numbers, etc.) is displayed on this screen. Message indicators (green / white circles) indicate when data messages are received.

General GPS Engine Type NCT2100D Receiver Type Black Box GIS (LBM Available) ASIC Type C-ASIC (C/A,P1,P2,L1,L2,WAAS) Digital Card Serial/Class 21872.3 RF Card Serial/Class 30675.0 Bootblock Software BootBlockV1.7 GPS Build ID NCT 120216.1921 IOP Build ID DAT060810.1559		Messages <input checked="" type="checkbox"/> 0x34 Ionospheric & UTC Data <input type="checkbox"/> 0x85 Channel Status <input checked="" type="checkbox"/> 0xB1 PVT <input checked="" type="checkbox"/> 0xB5 Pseudorange Noise Stats <input checked="" type="checkbox"/> 0xD1 LBD Authorization Status <input type="checkbox"/> 0xD3 LBD Status <input checked="" type="checkbox"/> Other Blocks
		Firmware Versions GPS 3.3.2 IOP 3.0 LBM 3.10
<input type="button" value="Query"/>		

The **Query** button can be used to request updated information from the receiver.

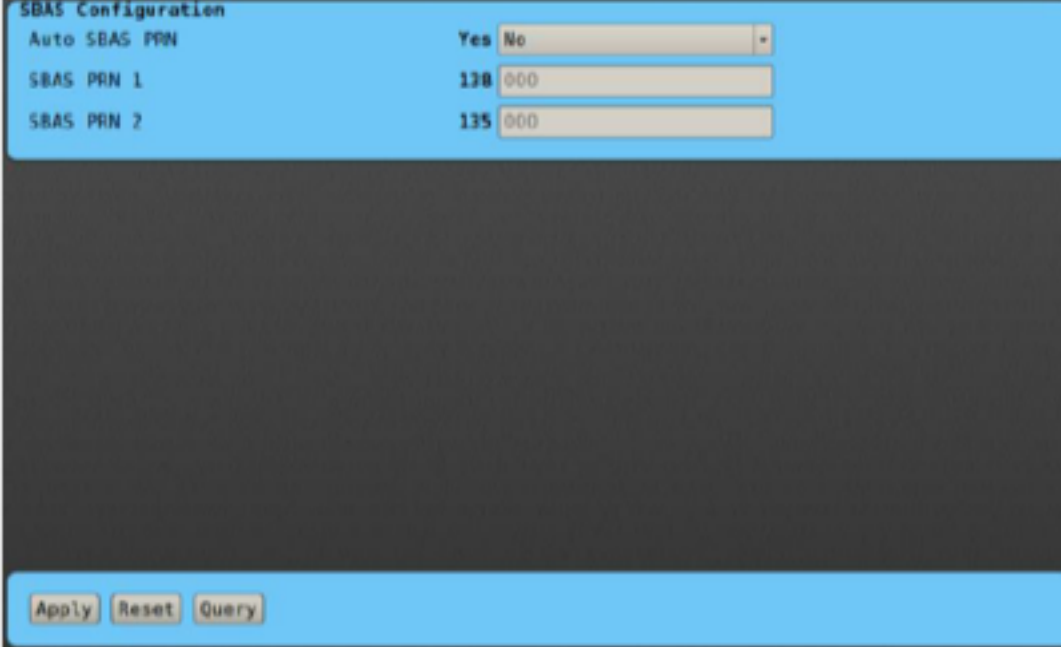
Solution Control

Various status indicators and control settings relevant to the corrections applied in the position solution are displayed on this screen. This information verifies system performance with respect to limits set by the operator.

General Elevation Mask 7 07 Minimum Satellites 3 03 Max Diff Age 50 0050 Nav Rate 1 1	Special Navigation Frequency Usage Dual Dual SET No No L1 Fallback -- No
Vertical 2D/3D Mode Selection Auto Auto 2D Height Last 3D Last 3D 2D Fixed Height -11.07 00011.07 Maximum 3D PDOP 10.0 10.0	
Corrections Signals Use CCS Yes Yes Use SBAS Yes Yes	Corrections Inputs Use RTCM Input Yes Yes DGPS Station 0 0000 Use RTK Input Yes Yes CCS Backing RTK Yes Yes
<input type="button" value="Apply"/> <input type="button" value="Reset"/> <input type="button" value="Query"/>	

SBAS Configuration

This screen allows the user to configure which SBAS satellites to use.



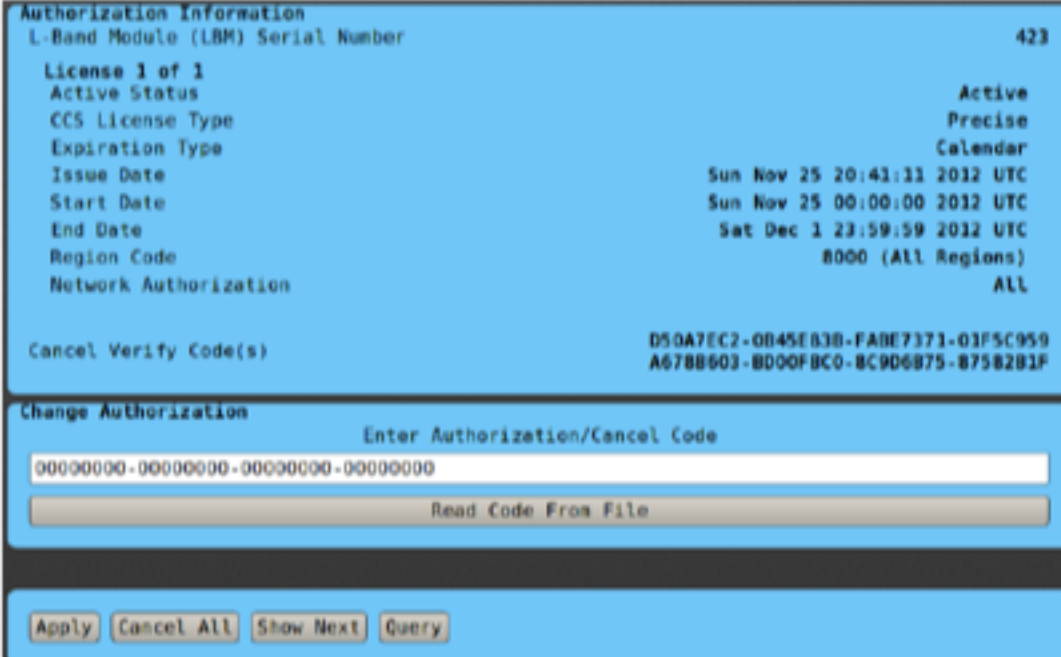
SBAS Configuration

Auto SBAS PRN	Yes	No
SBAS PRN 1	138	000
SBAS PRN 2	135	000

Apply Reset Query

Corrections Authorization

Current license information is displayed here and authorization codes can also be entered here.



Authorization Information

L-Band Module (LBM) Serial Number 423

License 1 of 1

Active Status	Active
CCS License Type	Precise
Expiration Type	Calendar
Issue Date	Sun Nov 25 20:41:11 2012 UTC
Start Date	Sun Nov 25 00:00:00 2012 UTC
End Date	Sat Dec 1 23:59:59 2012 UTC
Region Code	8000 (All Regions)
Network Authorization	ALL

Cancel Verify Code(s) D50A7EC2-0B45E83B-FABE7371-03F5C959
A678B603-BD00FBC0-8C9D6875-B758281F

Change Authorization

Enter Authorization/Cancel Code

00000000-00000000-00000000-00000000

Read Code From File

Apply Cancel All Show Next Query

Software Options

The options available to the user are encoded into and activated by the *Options Code*. This determines which settings and features are enabled in the system.



General Options	Digital Card Serial Number 21672	Corrections Options	SBAS Yes
Digital Card Class 3	Navigation Rate 5	RTCM Base Static/Dynamic	RTCM Rover Yes
Data Rate 5	Dual Frequency Yes	RTK Base No	RTK Rover No
Max Radio Power 1000mW	Radio Hopping Pattern 0		

Activate Software Options

Code Type 24-Character

Enter Options Code

000000 000000 000000 000000 000000 000000 000000 000000

000000 000000 000000 000000

Geo Fencing Information

Point 0 of 0 Latitude --

Radius (km) -- Longitude --

Next Point

Apply Query

Corrections Receiver

This screen contains status indicators relative to GNSS corrections received. Also, the user can manually set the *C-Nav Corrections Frequency* here.

Corrections Receiver DSP Software Version 8.14 DSP Status 71 Authorization Status Active		Frequency Status Expected Baseband -3778.00 Hz Tracked Baseband -3776.71 Hz Oscillator Error -109.31 Hz	
DownLink Status Signal to Noise Ratio 12.36 Locked Yes Packets Valid Yes Packets Percent Idle 15% Packets Percent Bad 0% Resync Count 42 FEC Quality 3		Voltage Status Input 13.8 V DSP Tuning 1 1.5 V DSP Tuning 2 1.6 V DSP Lock Detect 1 0.3 V DSP Lock Detect 2 0.0 V	

Corrections Receiver Settings

This screen allows the user to choose which CCS satellite to use, or to allow the receiver to automatically select which CCS satellite to use.

Satellite Selection Current Selection 1-98W Auto-Select Yes		
Available Satellites		
ID	Longitude	Look Angle
Auto-select		
1-98W	98.0W	54
2-54W	54.0W	35
1-25E	25.0E	1
2-64E	64.0E	1
1-143.5E	143.0E	1
2-178E	178.0E	1

Custom Satellite Operations

NMEA Output Control

Output data strings from the C-Nav2050 can be chosen by the settings in this screen. Some messages can be output "On Change", and will be delivered when new data is available; typically this is at the *Navigation Rate* of the receiver. The *Navigation Rate* can be set on the [Solution Control](#) screen. Other strings

NMEA Output Strings		Message Settings
Message	Current	Change to Apply
-ALM	Disabled	
-GGA	On Change	
-GLL	Disabled	
-GSA	Disabled	
-GSV	Disabled	
-RMC	Disabled	
VTG	On Change	
-ZDA	Disabled	
-GST	Disabled	
-PRCTSET	Disabled	
-GES	Disabled	
-PRCTMDE	Disabled	
-PRCTGST	Disabled	
-GRS	Disabled	

Message:
 Method:
 Rate (Hz):

can be set to output every "Fixed" number of seconds.

Port Configuration

COM1 and COM2 on the C-Nav2050 receiver can be configured here. Serial data transfer parameters (*Baud Rate* and *Parity*) should be set to match that of the C-NaviGator III port. Input/output protocols for the auxiliary port can also be accessed here.

Port Assignments	
COM 1	C-NaviGator
COM 2	Auxiliary

Auxiliary Port Communication Settings	
Baud Rate	19200 19200 ▾
Parity	None None ▾

Configure Auxiliary Port	
Raw Data Output	Disabled Disable ▾
NMEA Output	Enabled Enable ▾
RTCM Input/Output	Disabled Disable ▾
CMR Input	Disabled Disable ▾
CMR Output	Disabled Disable ▾

Apply Reset Query

1PPS Configuration

Settings for the 1PPS output can be modified from this screen.

1PPS Settings	
Active Edge Direction	Rising Rising ▾
Pulse Width (s)	0.10 0.00
Delay (s)	0.000000 0.000000

Apply Reset Query

RTK Settings

Use this screen to adjust the RTK settings of the C-Nav2050.



Setting	Value
RTK Engine Type	Ultra
Position Mode	Low Velocity
Multipath Indicator	Open Sky
Time Sync	No
Enabled	Yes
KF Cutoff Angle	7
AR Search Cutoff Angle	10
Max Base Data Age	300
Max Base Data Age for AR	15

RTCM Output Control

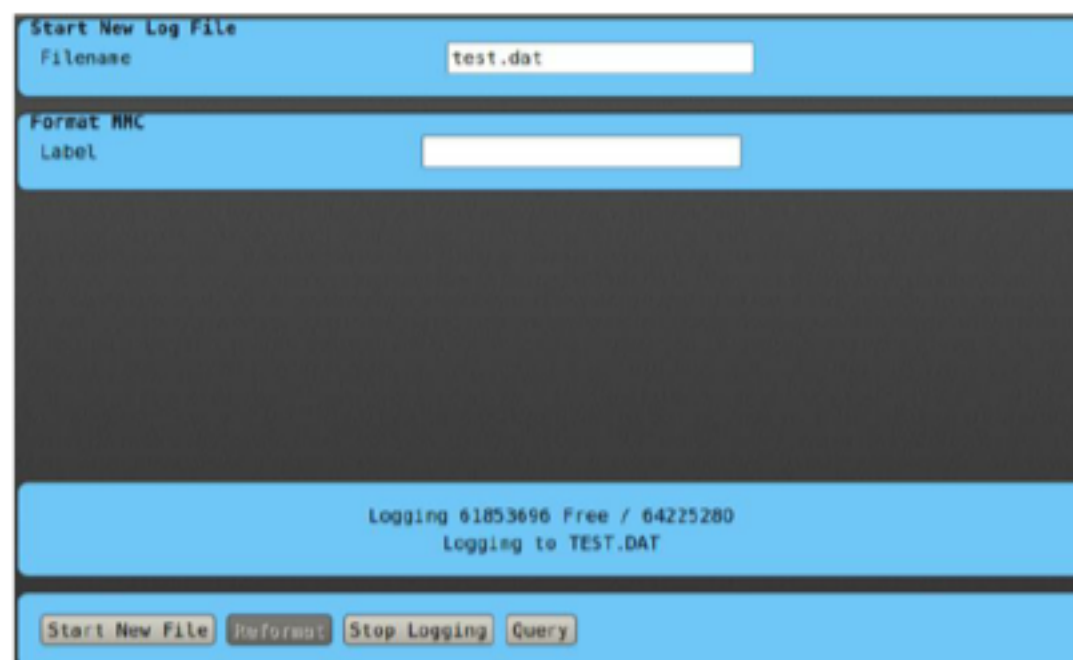
The RTCM (Radio Technical Commission for Maritime Services) standard SC-104 correction type and rates for the C-Nav2050 are implemented here.



Setting	Value
RTCM Code Corrections Output	Type 1
Dynamic RTCM	No
Station ID	2 0002
Code Corrections Rate (0 = 1Hz)	1 00001
Type 3/22 Message Rate (0 = Off)	1 001
Send RTCM Output To	C-Nav2050 Auxiliary Port

MultiMediaCard (MMC) Administration

Control of the internal MMC Logging is handled here. Data can be logged to the internal MMC of the C-Nav2050.

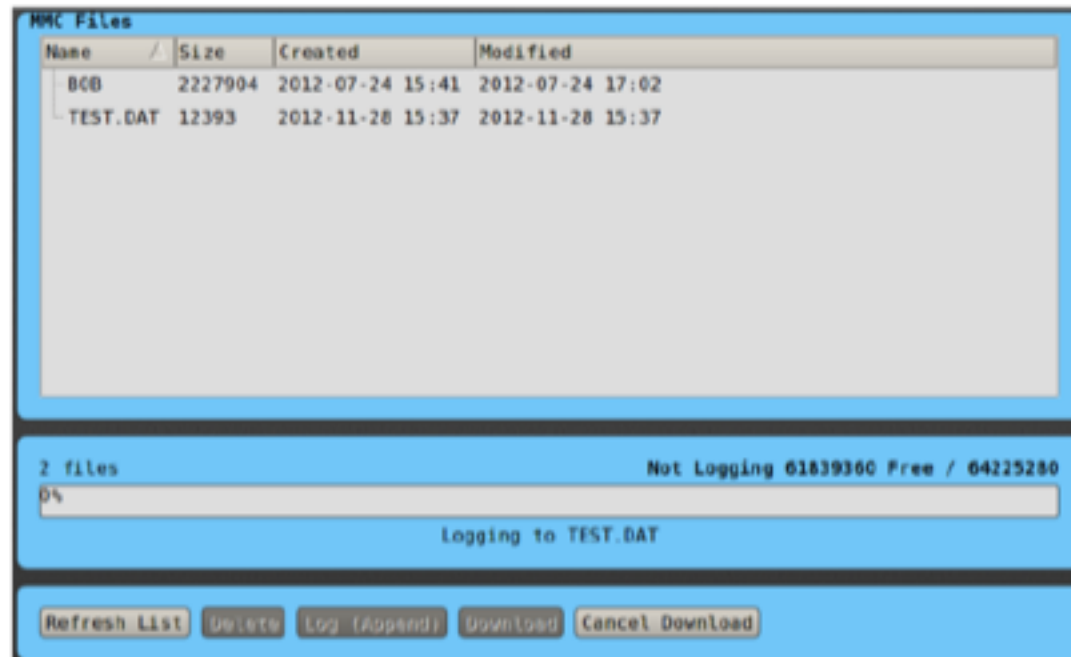


Field	Value
Start New Log File (Filename)	test.dat
Format MMC Label	

Logging 61853696 Free / 64225280
Logging to TEST.DAT

MMC Files

Control of files on the MMC Internal memory is handled here. Including transferring a file to a USB device



Firmware Update

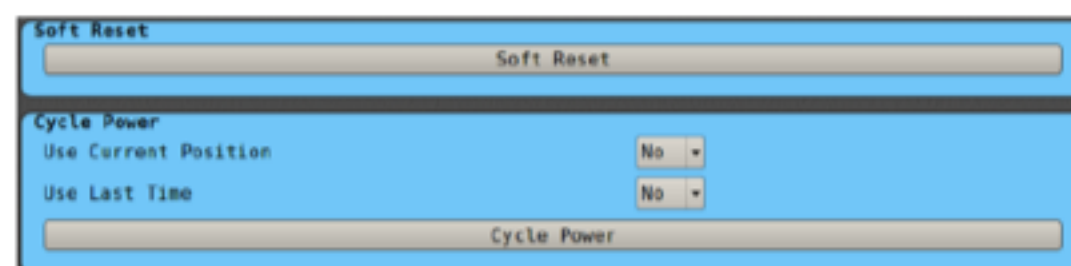
The C-Nav2050 receiver's firmware can be installed from this screen. Ensure that the USB memory device is installed. Press the **Select Package** button to search the USB memory stick for available firmware. Press **Update Firmware** to upload the new code into C-Nav2050 memory. Information regarding the new version is displayed in the information window.



Warning:
Do not unplug the USB device while the memory is uploading.

Reset

Use this screen to restart your C-Nav2050.



C-Nav2000

Receiver Information

Specific information regarding the GNSS receiver (including firmware / hardware version, etc.) is displayed on this screen. Message indicators (green / grey circles) indicate the Message status. Green circles indicate messages are being received by C-NaviGator III.

General		Messages	
RF Serial Number	15736	<input checked="" type="checkbox"/> 0x01 Starfire	
RF Hardware Version	0	<input checked="" type="checkbox"/> 0x02 GPS	
SF Serial Number	204894	<input checked="" type="checkbox"/> 0x03 Satellites	
SF Hardware Version	17	<input type="checkbox"/> 0x04 System	
SF Software Version	14.3	<input type="checkbox"/> 0x05 Almanac	
GPS Serial Number	15134	<input type="checkbox"/> GGA Message	
GPS Hardware Version	3	<input checked="" type="checkbox"/> GST Message	
GPS Software Version	51.33	<input checked="" type="checkbox"/> RTCM 104 Data	
GPS Software Time Stamp	NCT 041130.1240	<input type="checkbox"/> Other	
GPS Software Boot Block	BootBlockV1.7		

Query

The **Query** button can be used to request updated information from the receiver.

Solution Control

General operating parameters and position solution control for the C-Nav2000 are accessed here. These settings define the acceptable operating limits, correction signal settings, vertical/3D control, correction devices and signals, etc.

General		Special Navigation	
Elevation Mask	7 07	Frequency Usage	Dual Dual
Max Diff Age	1200 1200		
Nav Rate	5 1		

Vertical	
2D/3D Mode Selection	Auto Auto
2D Fixed Height	0.00 00000.00
Maximum 3D PDOP	20.0 20.0

Corrections Signals	
Use CCS	Yes Yes
Use SBAS	Yes Yes
SBAS PRN 1	133 133
SBAS PRN 2	138 138

Apply Reset

Corrections Authorization

The operator can access information and enter the authorization code into the C-Nav2000 receiver. As part of standard procedure, operators should periodically check the expiration date to avoid gaps in service.

Authorization Information	
Grace Periods Remaining	0
Authorized Days Remaining	10
Expiration Date	Sat Dec 8 00:00:00 2012 UTC
Authorization Level	Dual
Authorization Status	Valid
Cancel Code	
Last Authorization Code	38029312 10075398 22674770
Last Authorization Result	Valid

Change Authorization	
Use Grace Period	No
Enter Authorization/Cancel Code	38029312 10075398 22674770

Apply

Corrections Receiver

This screen contains mainly status indicators relative to the GNSS corrections received by the system. Also, the user can manually set the *C-Nav Corrections Frequency* here.

Corrections Receiver		Frequency Status	
DSP Software Version	9.8	Channel Number	29745
DSP Status	17199	Expected Baseband	2416.00 Hz
Authorization Status	Valid	Tracked Baseband	2348.87 Hz
		Oscillator Error	-123.50 Hz

DownLink Status		Voltage Status	
Signal to Noise Ratio	13.37	Input	20.0 V
Locked	Yes	DSP Tuning 1	1.7 V
Packets Valid	Yes	DSP Tuning 2	2.0 V
Packets Percent Idle	12%	DSP Lock Detect 1	0.3 V
Packets Percent Bad	0%	DSP Lock Detect 2	0.0 V
Resync Count	2		
FEC Quality	3		

Corrections Frequency	
Current Frequency	Manual
Select Frequency	Manual
Manual Frequency (MHz)	1530.8725 MHz

Apply Reset

Output Control

NMEA and RTCM output are controlled from this screen.

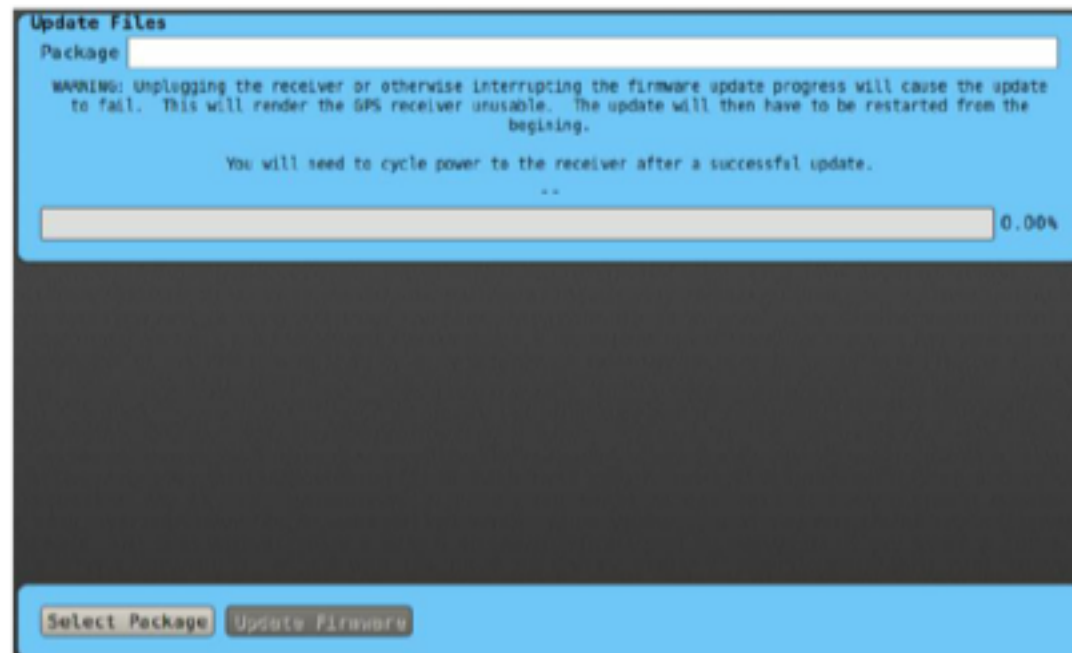
Output Control	
GGA	Yes Yes
GSA	Yes Yes
ZDA	Yes Yes
VTG	Yes Yes
RMC	Yes Yes
NAVQ	Yes Yes
NETQ	Yes Yes
RXQ	Yes Yes
SATS	Yes Yes
GST	Yes Yes

RTCM Output	
Output RTCM	Off Off

Apply Reset

Firmware Update

The C-Nav2000 receiver's firmware can be installed from this screen. Ensure that the USB memory device is installed. Press the **Select Package** button to search the USB memory stick for available firmware. Press **Update Firmware** to upload the new code into C-Nav2000 memory. Information regarding the new version is displayed in the information window.



Warning:

Updates of a C-Nav2000 typically require 25-30 minutes. This process should not be interrupted as it may leave the receiver in an inoperable state if not completed successfully.

Warning:

Do not unplug the USB device while the memory is uploading.

C-Nav1010

Receiver Information

General information about the C-Nav1010 GNSS receiver (such as firmware / hardware versions, serial numbers, etc.) is displayed on this screen. Message indicators (green / grey circles) indicate when data messages are received.

General NAV Processor Serial: 30173 LBD Serial Number: 90 Digital Card Type: 2 GPS Build ID: Feb20201214:49:52 Hardware Configuration: 172		Messages <input checked="" type="checkbox"/> 0x34 Ionospheric & UTC Data <input checked="" type="checkbox"/> 0x86 Channel Status <input checked="" type="checkbox"/> 0xB1 PVT <input checked="" type="checkbox"/> 0xB5 Pseudorange Noise Stats <input checked="" type="checkbox"/> 0xD1 LBD Authorization Status <input type="checkbox"/> 0xD3 LBD Status <input checked="" type="checkbox"/> Other Blocks
Firmware Versions GPS: 2.2.12 IOP: 1.5.9 LBD: 2.6		
<input type="button" value="Query"/>		

The **Query** button can be used to request updated information from the receiver.

Solution Control

Various status indicators and control settings relevant to the corrections applied in the position solution are displayed on this screen. This information verifies system performance with respect to limits set by the operator.

General Elevation Mask: 7 07 Minimum Satellites: 3 03 Max DITF Age: 1200 1200 Nav Rate: 1 1 SET: Yes Yes	
Vertical Use Fixed Height: No No Fixed Height: 0.00 00000.00 Maximum PDDP: 10.0 10.0	
Corrections Signals Use CCS: Yes Yes Use SBAS: Yes Yes	Corrections Inputs Use RTCM Input: Yes Yes DGPS Station: 1 0001 Use RTK Input: No No
<input type="button" value="Apply"/> <input type="button" value="Reset"/>	

Corrections Authorization

Current license information is displayed here and authorization codes can also be entered here.

Authorization Information Serial Number: 30173 LBD Serial Number: 90 License 1 of 1 Active Status: Active CCS License Type: Precise Expiration Type: Calendar Issue Date: Wed Nov 28 15:41:33 2012 UTC Start Date: Wed Nov 28 00:00:00 2012 UTC End Date: Fri Dec 7 23:59:59 2012 UTC Region Code: 8000 (All Regions) Network Authorization: ALL Cancel Verify Code(s): --	
Change Authorization Enter Authorization/Cancel Code 78DCC914-43483A47-6FF40EC6-24A947CE <input type="button" value="Read Code From File"/>	

Software Options

The options available to the user are encoded into and activated by the *Options Code*. This determines which settings and features are enabled in the system.

General Options		Corrections Options	
Digital Card Serial Number	30173	CCS	No
Digital Card Class	2	SBAS	Yes
Navigation Rate	1	RTCM Rover	Yes
Data Rate	1	External Starfire License	No
		License All	No

Activate Software Options

Enter Options Code

00000000 00000000 00000000 00000000

Geo Fencing Information

Point	0 of 0	Latitude	--
Radius (km)	--	Longitude	--

Next Point

Apply

Corrections Receiver

This screen contains status indicators relative to GNSS corrections received.

Downlink Status	
Signal to Noise Ratio	8.61
Packets Percent Idle	39.02%
Packets Percent Bad	0.00%
Resync Count	7346
Synced	Yes
LBD State	9
Message Count	5376766
Packet Count	9405166
Time Of Week	Wednesday 25:45:34

Select Satellite

Corrections Receiver Settings

This screen allows the user to choose which *CCS Satellite* to use, or to allow the receiver to automatically select which *CCS Satellite* to use.

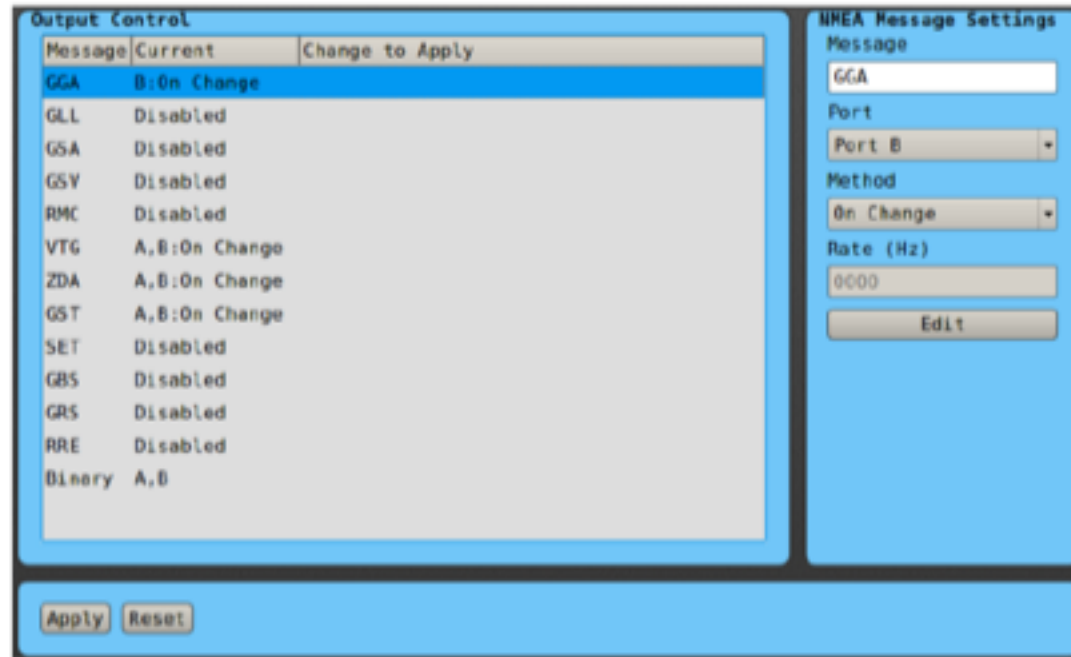
Satellite Selection			
Current Selection	1-98W	Auto-Select	Yes
Available Satellites			
ID	Longitude	Look Angle	
Auto-select			
1-98W	98.0W	54	
2-54W	54.0W	35	
1-25E	25.0E	1	
2-64E	64.0E	1	
1-143.5E	143.0E	1	
2-178E	178.0E	1	

Custom Satellite Operations

Apply Reset Status

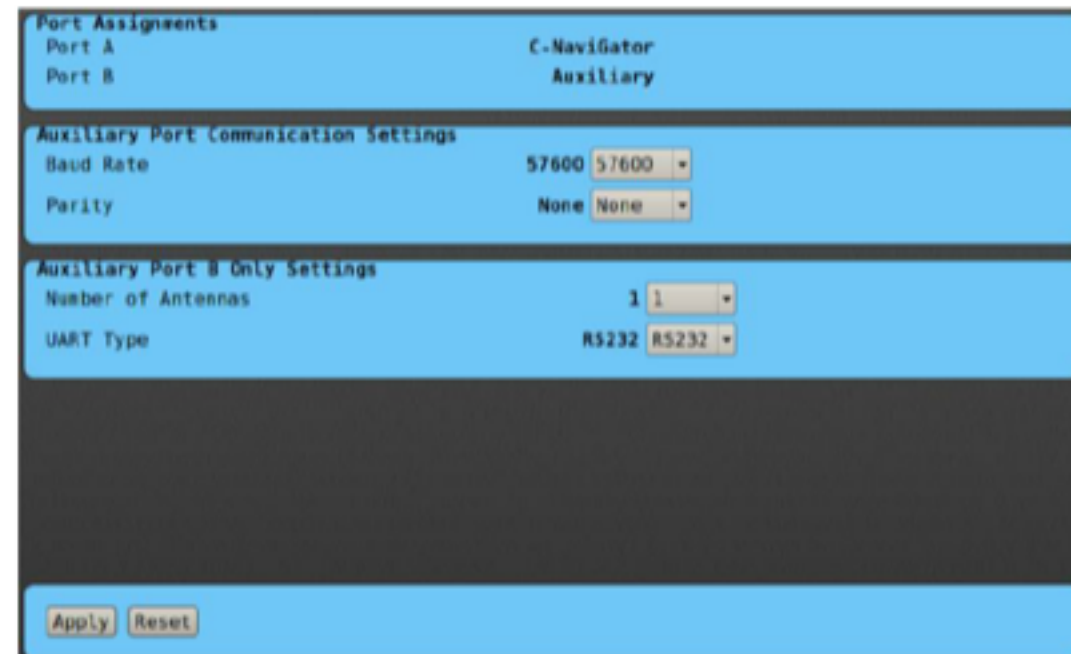
Output Control

Output data strings from the C-Nav1010 can be chosen by the settings in this screen. Some messages can be output “On Change”, thus output at the *Navigation Rate*. The *Navigation Rate* can be set on the [Solution Control](#) screen. Other strings can be set to output every “Fixed” number of seconds.



Port Configuration

COM1 and COM2 on the C-Nav1010 receiver can be configured here. Serial data transfer parameters (*Baud Rate* and *Parity*) should be set to match that of the C-NaviGator III port.



Firmware Update

The C-Nav1010 receiver’s firmware can be installed from this screen. Ensure that the USB memory device is installed. Press the **Select Package** button to search the USB memory stick for available firmware. Press **Update Firmware** to upload the new code into C-Nav1010 memory. Information



regarding the new version is displayed in the information window.

Warning:

Do not unplug the USB device while the memory is uploading.

NMEA Input

Status

Sentence string status indicators identify which information the GNSS receiver supplies.



Output

Output Settings

All output control and data transfer functions are accessible from this screen. These include Port information, NMEA string selections, output filter settings, etc.

Output Configuration			
Input Port		Port 3	Port 3 ▾
Standard NMEA	2	Enabled	Settings...
Proprietary C-Nav		Disabled	Settings...
Dynamic Position GGA		Disabled	Settings...
Raw Device Message		Disabled	Settings...
MBRTK-related		Disabled	Settings...
Other Output		Disabled	Settings...
Standard NMEA Output			
NMEA Version	3.01	3.01 ▾	Strict NMEA
Output GGA	Yes	Yes ▾	Output GSV
Output GLL	No	No ▾	Output RMC
Output GSA	No	No ▾	Output VTG
Output GST	No	No ▾	Output ZDA
Force Talker ID	No	No ▾	GGA Ref ID
			Proprietary Proprietary ▾
<input type="button" value="Apply"/> <input type="button" value="Reset"/>			

Section 5 - Maintenance

Troubleshooting

No Position Information

Position Information on the top of the screen is blank.

- 1) Check cable interconnections.
- 2) Go to – **Menu / Settings / Serial Ports** and verify that the settings correspond to the correct input connection.

No Serial Input / Output

The most common cause of data transfer problems is an incorrect setting in the port configuration.

- 1) Check that the serial port settings are correct and that they match the input / output device. Select **Menu / Settings / Serial Ports / xxxx**.
- 2) For C-Nav2000 and C-Nav2050, the data transfer settings should be 19200 / 8 / None / 1.
- 3) For C-Nav1010 and C-Nav3050, the data transfer settings should be 57600 / 8 / None / 1.

Updating Software

New software versions for the C-NaviGator III will be posted on the C-Nav website at www.cnnav.com. The software can be downloaded and saved to the supplied USB Thumb Drive for use with C-NaviGator III.

To verify that the latest software is installed, check the [About](#) screen from the [Help](#) menu.

Follow these procedures:

- 1) Plug the USB memory device that contains the new software into one of the USB ports on the C-NaviGator III underside panel.
- 2) Reset the C-NaviGator III unit.
- 3) When the system menu screen appears, press the **Update** button.
- 4) Follow the on screen instructions.

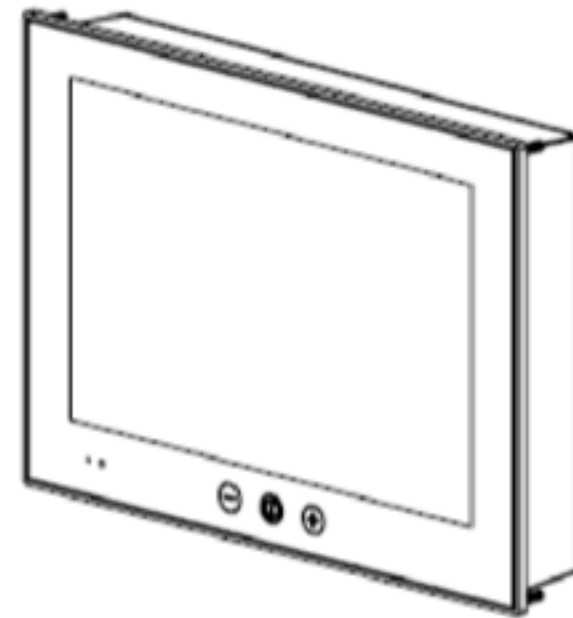
Hardware

Section 6 - General

Introduction to Hardware

The C-NaviGator III offers the ultimate in performance, convenience, state of the art design, and enduring quality for our customers. The C-NaviGator III offers a range of feature sets optimized for varying requirements and applications.

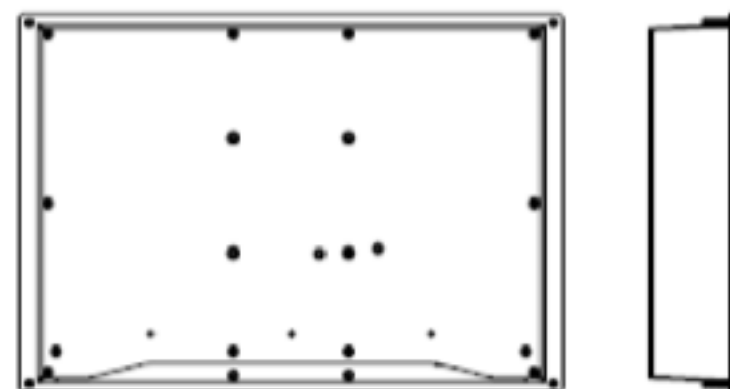
The C-NaviGator III is a flexible all-in-one monitor & PC solution, designed and type approved for the professional marine segment, where reliability and long life time are key prerequisites for the industry. The product range combines state of the art display and computer technology with innovative features and options, making it all that the integrator needs for top class type approved marine systems.



The C-NaviGator III is delivered with a factory-mounted Projected Capacitive Touch Screen (Multi-touch, USB interface) and features HATTELAND® Glass Display Control™, LED backlight technology, and full dimming.

A computer and display, all in one...

- Multi-touch
- Type Approved
- IP22 rear / IP66 front
- Superior Bonding Technology
- Module based, tailor-made systems made easy
- GLASS DISPLAY CONTROL™ (GDC), Solid State Menu System



Supplied Equipment

The C-NaviGator III CDU Bundle (P/N 0CNG003-0) consists of the following items:

- C-NaviGator III Display Unit with External USB cable (P/N HATC-NAVIGATOR III)
- C-NaviGator III Power Supply Unit (PSU) with US, UK and EU line cords (P/N HATHT00255-OPT-A1)
- USB Thumb Drive (P/N 7CNG002-0)

Optional Equipment

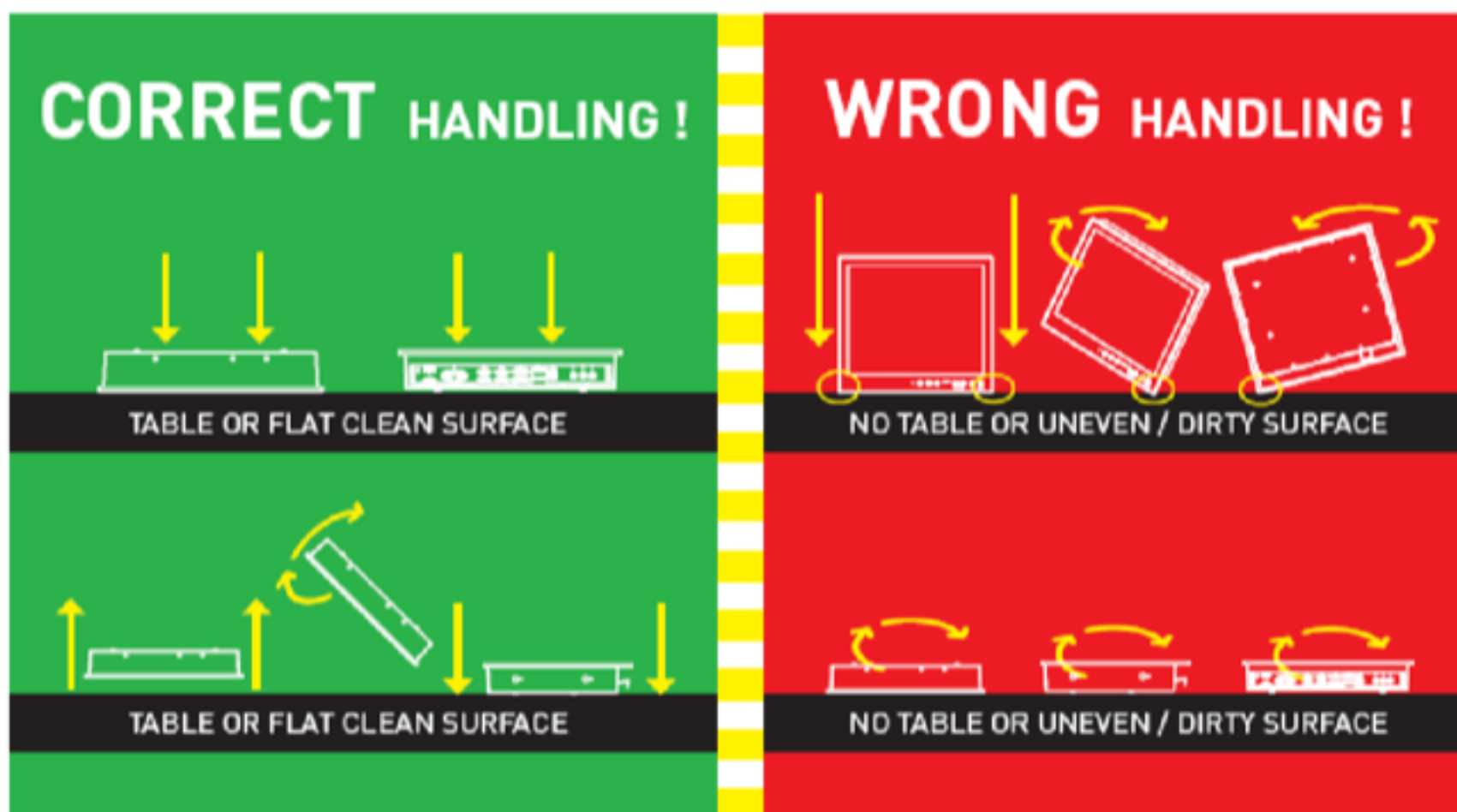
The C-Navigator III also consists of the following items used for mounting or for transporting the C-NaviGator III:

- C-NaviGator III Rugged Case (P/N 3GTR005-0)
- C-NaviGator III 19" Rack Mounting Plate (P/N HATJH 13TAP STD-A1)
- Flat Screen Table Stand (P/N CHIFSB018BLK)

Section 7 - Installation

Attention:

To prevent damage to chassis corners and / or breaking the front glass, please review the illustrations below before handling the units!



Installation and Mounting

- 1) Most of our products are intended for various methods of installation or mounting (panel mounting, bracket mounting, ceiling/wall, console mounting etc.); for details, please see the relevant mechanical drawings.
- 2) Adequate ventilation is a necessary prerequisite for the life of the product. The air inlet and outlet openings must definitely be kept clear; coverings which restrict ventilation are not permissible.
- 3) Generally, do not install the unit in a horizontal position (lying down), as this will cause heat to build up inside the unit which will damage the LCD Panel. To prevent this problem we recommend installing the unit in a vertical position (± 30 degrees) to improve the airflow through the unit.
- 4) To further improve the cooling of the unit we recommend installing Cooling Fans underneath blowing upwards into the unit air inlet. This may be

- required in high temperature applications and also when there is reason to expect temperature problems due to a non-optimal way of mounting.
- 5) Exposure to extreme direct sunlight can cause a considerable increase in the temperature of the unit and might under certain circumstances lead to over-heating. This point should already be taken into consideration when the bridge equipment is being planned (sun shades, distance from the windows, ventilation, etc.)
 - 6) Space necessary for ventilation, for cable inlets, for the operating procedures and for maintenance, must be provided.
 - 7) If the push buttons of the product are not illuminated, an external, dimmable illumination (IEC 60945 Ed. 4, 4.2.2.3, e.g. Goose neck light) is required for navigational use. The illumination shall be dazzle-free and adjustable to extinction.
 - 8) Information about necessary pull-relievers for cables is indicated in the Physical Connection section of this manual. Attention must be paid to this information so that cable breaks will not occur, e.g. during service work.
 - 9) Do not paint the product. The surface treatment influences on the excess heat transfer. Painting, labels, or other surface treatments that differ from the factory default might cause overheating.
 - 10) Expose to heavy vibration and acoustic noise might under certain circumstances affect functionality and expected lifetime. This must be considered during system assembly and installation. Mounting position must carefully be selected to avoid any exposure of amplified vibration.

General Mounting Instructions

- 1) The useful life of the C-NaviGator III generally decreases with increasing ambient temperature; it is therefore advisable to install such units in air-conditioned rooms. If there are no such facilities these rooms must at least be dry, adequately ventilated, and kept at a suitable temperature in order to prevent the formation of condensation inside the display unit.
- 2) Cooling of the C-NaviGator III takes place via the surface of the casing. The cooling must not be impaired by partial covering of the unit or by installation of the unit in a confined cabinet.
- 3) In the area of the wheel house, the distance of the C-NaviGator III from the magnetic standard compass or the magnetic steering compass must not be less than the permitted magnetic protection distance. This distance is measured from the center of the magnetic system of the compass to the nearest point on the C-NaviGator III. The compass safe distance of the C-NaviGator III is at least 80cm (31.5") from a standard compass; at least 45cm (18") from a steering compass.

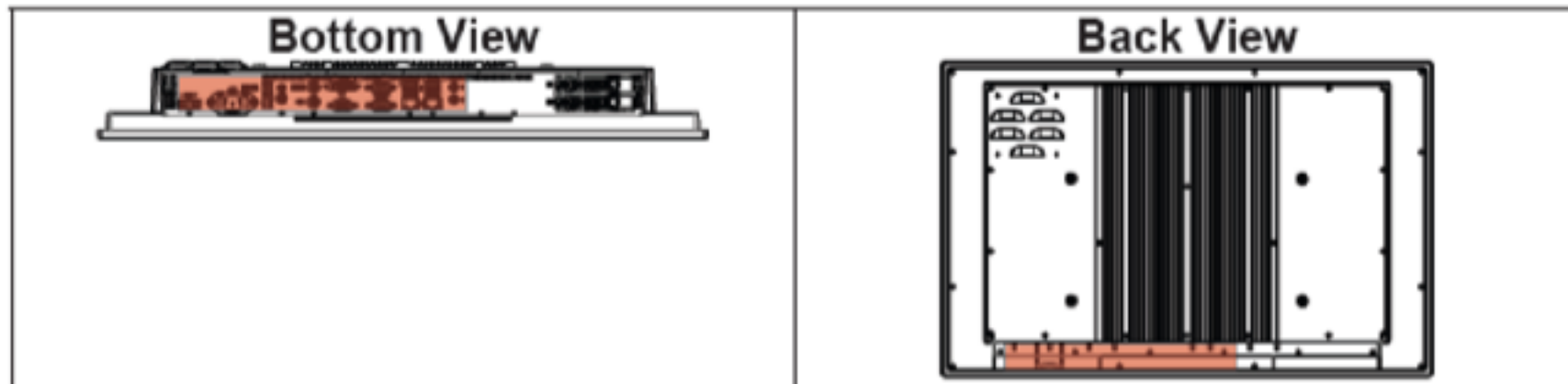
- 4) When selecting the site of a display unit, the maximum cable lengths have to be considered.
- 5) When a product is being installed, the surface base or bulkhead must be checked to ensure that it is flat in order to avoid twisting of the unit when the fixing screws are tightened, because such twisting would impair mechanical functions. Any unevenness should be compensated for by means of spacing-washers.
- 6) The grounding screws of the units must be connected to the body of the ship (ground); the wire used should have a cross sectional area of at least 6 mm² (10AWG).
- 7) Transportation damage, even if apparently insignificant at first glance, must immediately be examined and be reported to the freight carrier. The moment of setting-to-work of the equipment is too late, not only for reporting the damage but also for the supply of replacements.
- 8) The classification is only valid for approved mounting brackets provided by C & C Technologies. The unit shall be mounted stand-alone without any devices or loose parts placed at or nearby the unit. Any other type of mounting might require test and re-classification.

Ergonomics

- 1) Adjust the unit height so that the top of the screen is at or below eye level. Your eyes should look slightly downwards when viewing the middle of the screen.
- 2) Adjust screen inclination to remain gaze angle to the center of the screen approximately perpendicular to the line of gaze.
- 3) When products are to be operated both from a sitting position and from a standing position, a screen inclination of about 30° to 40° (from a vertical plane) has turned out to be favorable.
- 4) The brightness of displays is limited. Sunlight passing directly through the bridge windows - or its reflection - which falls upon the screen workplaces must be reduced by suitable means (negatively inclined window surfaces, venetian blinds, distance from the windows, dark coloring of the deckhead). However, units can be offered with optical enhanced technology to reduce reflections and are viewable in direct sun light; but as a general rule it is recommended to install or mount the units at the bridge wing area by suitable alignment or bulkhead / deckhead mounting in such a way that reflections of light from the front pane of the display are not directed into the observer's viewing direction.
- 5) The use of ordinary commercial filter plates or filter films is not permitted for items of equipment that require approval (by optical effects, "aids" of that kind can suppress small radar targets, for example).

Cables

Use only high quality shielded signal cables.



Cable Entries & Connectors (Marked area) - Illustration only

Maximum Cable Length

Any cable should generally be kept as short as possible to provide a high quality input / output. The maximum signal cable length will depend on the signal resolution and frequency.

Configuring Housing Connectors

Housing connectors are available in different sizes (2-pin, 4-pin or 5-pin) which plugs into the connector area of the unit. These housing connectors are by factory default mounted on the unit. Below is a brief illustration that might be useful during configuration and installation of such connectors. You will need suitable pre-configured cable(s) and tools to configure the connector(s) and cable(s) that are present in your installation environment. Below is a sample for a 2-pin DC power connector. The procedure is the same for other connectors of this type.

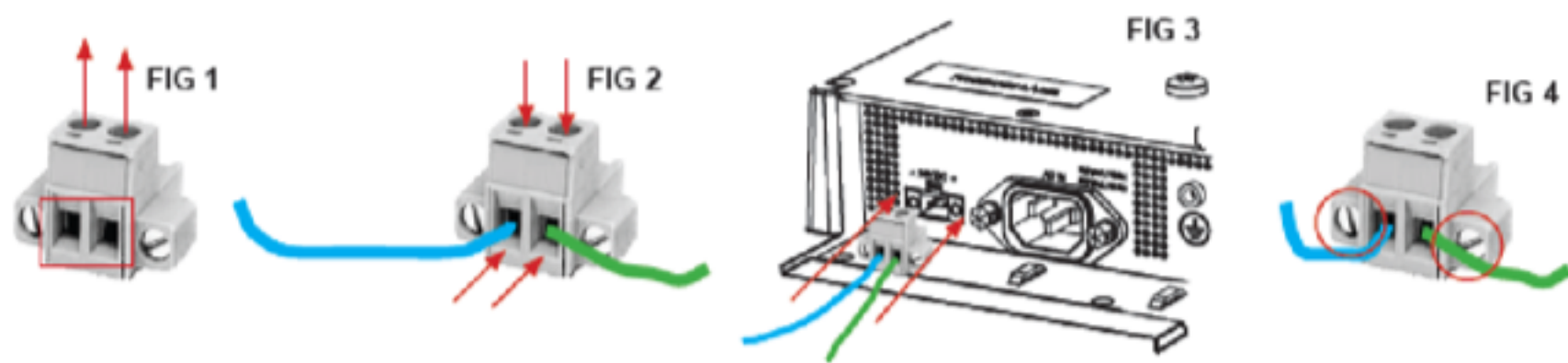


FIG 1: Unscrew (from top) or make sure that the screw terminals (square area) are fully open, so you can secure the inserted cables correctly to the loose housing connector (it may already be plugged into the unit as per factory installation).

FIG 2: Insert cables* (from front) and screw / secure the cables by turning the screw on top of the housing to secure the cables properly. Check that the cables are firmly in place and do not appear loose or fall out when pulling gently.

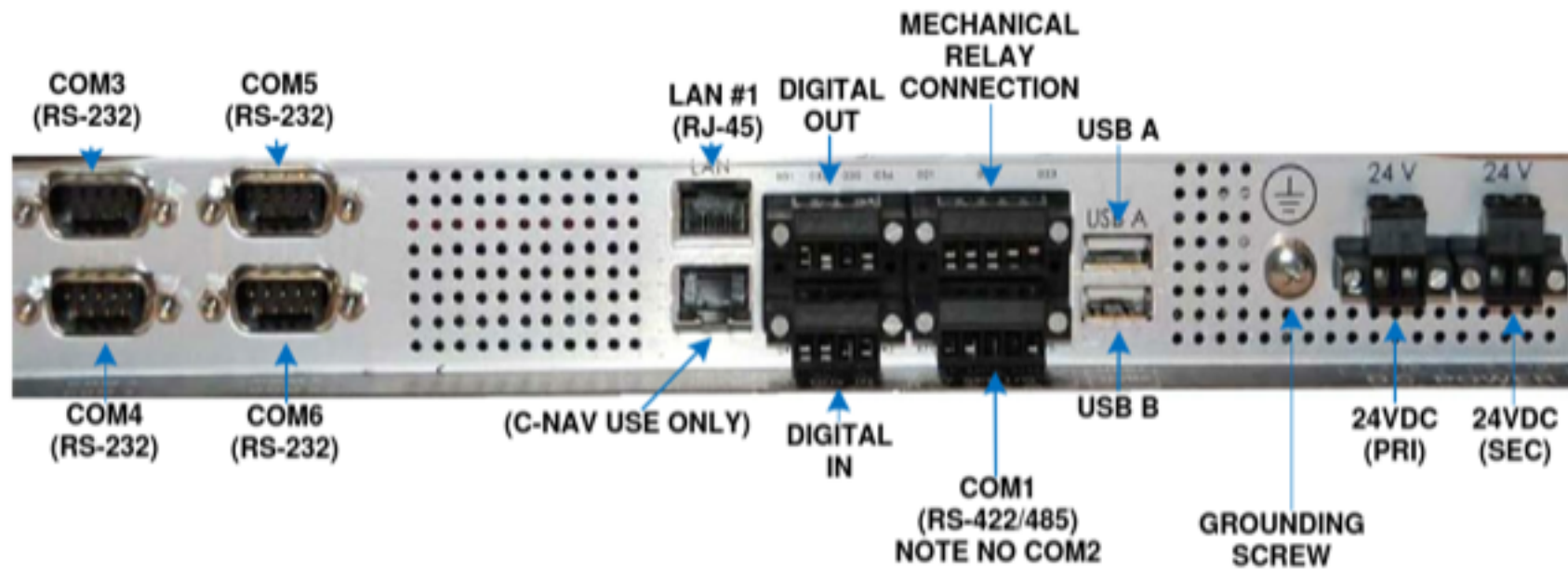
***Note:**

Required polarization verification (for instance -/+ for DC power input) should conform to the markings on the connector area of the unit. Ignoring the markings on the unit or its add-on modules might damage the unit and / or external equipment in which end, warranty will be void.

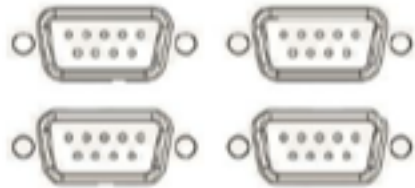
FIG 3: Plug the housing into the appropriate connector area of the unit and check again that the cables secured conform to the markings on the connector area of the unit. Finalize the installation by fastening the screws located in front on each side of the housing connector (**FIG 4**).

Section 8 – Physical Connections

C-NaviGator III Connections



COM Module RS-232 (COM3-COM6)



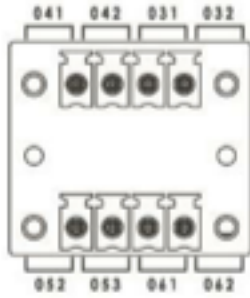
The COM modules provide the system with quad independent COM channels. The module is attached to the motherboard via standard USB interface. Application software accesses the COM channels as standard COM devices, i.e. in the normal case if there are no requirements for additional software development. This module will mainly be integrated, electrical and mechanical, in the C-NaviGator III.

Network / LAN Input / Output (NET A / NET B)



Supports 10/100/1000Mbps Ethernet (LAN). Suitable for twisted pair cables CAT.5E. Make sure the network cable connector “clicks” into the RJ-45 connector. Only one RJ-45 port is available; the other RJ-45 port is for C-Nav use only and is blocked off.

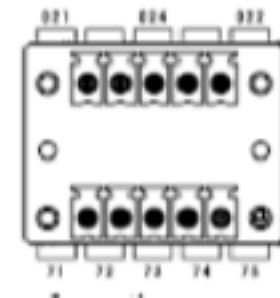
Digital Input / Output (X1 DIG OUT / X1 DIG IN)



A majority of your inputs / outputs for your applications will be through the COM, USB, and LAN ports. However, a mechanical and digitally driven “Solid State Relay” (NO/NC/COM/24VDC) (over current protection) connector block, which allows the user via software to control external equipment that requires or are compatible with the specifications, is attached to the C-NaviGator III Display Unit. Connect and fasten your cables from your compatible external equipment to the SCD 90F connector block.

Digital Output / Serial I/O (X1 DIG OUT / X7 SER I/O)

It is a two-function connector. First, a COM port (isolated RS-422/485) functionality to communicate with serial based equipment is available on the “X7 SER I/O” this connector. This is known as COM1. Please note that there is no COM2.



Furthermore, if required, a mechanical and digitally driven relay “X1 DIG OUT, Mechanical Relay” (NO/NC/COM) which allows the user via software to control external equipment that require or are compatible with the specifications. If relay is off, PIN1 and PIN5 are connected. When relay is on, PIN1 and PIN3 are connected.

Connect and fasten your cables from your compatible external equipment to the SC 90F connector block.

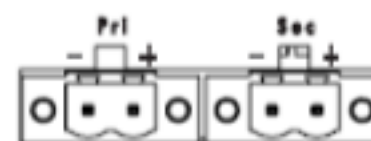
USB Input / Output

This supports any USB1.1 (12Mbps) and USB2.0 (480Mbps) compliant peripherals. Drivers for most USB devices are usually included in operating system or on separate installation DVD's delivered with Third Party products. USB 1.1 devices will operate in USB 1.1 mode (12 Mbps). USB1.1 is suitable for cable distances above 10 meter / 32.8 feet, whereas USB2.0 is suitable from less than 10 meter / 32.8 feet distances. 2 ports are available. As an option, the user can connect the external USB cable (provided with the bundle) to one of the two USB ports.



Power Inputs

Connect your DC power cables to the SL-SMT 90F connector block. The internal DC power module supports 24VDC. The unit offers both primary (Pri) and secondary (Sec) power inputs for secure operation of the unit as well as galvanic isolation and automatic switching between power sources. An external AC- DC Power Supply Unit (PSU) is provided with the C-NaviGator III bundle.



Grounding Screw

DC models are required / recommended to be properly grounded via the screw located on both the Display Unit and the Power Supply Unit.




Section 9 - Operation

User Controls Overview

The C-NaviGator III units are designed by using HATTELAND® Glass Display Control™ (GDC) touch technology to allow interactivity, adjusting brilliance (brightness), and control power on / off with the use of illuminated symbols. Note that these symbols are only visible (backlight illuminated) when suitable power is connected. There are no physical moving knobs, potentiometers, wheels, or push buttons available as everything is touch surface controlled, which allows a human finger (including several types of gloves) to control the unit.



Power On / Off

 Touching this symbol will either turn the C-NaviGator III Display Unit On or Off. The Power Indicator LED is lit when power is supplied.

Brightness Adjustment

⊖ ⊕ Brilliance / brightness adjustment of the displayed image is adjusted by touching the (-) or (+) illuminated symbols. Both symbols are visible as long as the unit is powered.

Section 10 - Specifications

TFT Technology

- 13.3 inch TFT Liquid Crystal Display module
- Widescreen, Aspect Ratio 16:10
- a-si TFT Active Matrix
- CCFL Backlight

TFT Characteristics

Native Resolution	1280 x 800 (WXGA)
Pixel Pitch (RGB)	0.2235 (H) x 0.2235 (V) mm
Response Time	6/10ms (typical) (Tr/Tf)
Contrast Ratio	800:1 (typical)
Light Intensity	400 cd/m ² (typical)
Viewable Angle	70 deg (H) 60 deg (V) (typical)
Active Display Area	286.08 (H) x 178.8 (V) mm
Max Colors	262000

Computer Specifications

Installed OS	Linux Based OS
CPU/Processor	1 x Intel® Atom™ N450, 1.66GHz, 512KB L2 Cache
Installed Storage	1 x 8GB 2.5" SATA SSD
Installed Memory	1 x 1GB 200-pin DDR2 667MHz
System Chipset	Intel® NM10 / ICH8M
Graphics Chipset	Intel® GMA 3150
BIOS	AMIBIOS
Speaker	None
Buzzer	Yes (according to EN60945)

Power Manager	ACPI
HW Status Monitor	Temperatures, voltages, & cooling fan status
Resolution Range	From 640 x 480 to 1280 x 800
Sync. Range	Horizontal: 24 kHz to 81 kHz, Vertical: 50 Hz to 75 Hz*

Power Specifications

Power Supply

2 x 24VDC	Model HD 13T21 MMC-Exx-xxxx
-----------	-----------------------------

Dual input, galvanic isolated, automatic switch between power sources

Power Consumption

Operating	20W (typ) - 30W (max)
-----------	-----------------------

Physical Dimensions

- 355.00 (W) x 248.50 (H) x 58.00 (D) mm
- 13.98" (W) x 9.78" (H) x 2.28" (D)
- 4 x M4 VESA mounting 75x75mm, Max 8mm deep
- Built-in Console mounting 4 x M5x15mm screws
- Weight: 4.4kg / 9.7lbs

User Controls

Behind Front Bezel - Glass Display Control™ (GDC) IP66

- Power On / Off, Brightness Control (- / +), Light Sensor (not visible)
- Programmable Alarm LED, Buzzer (not visible)

Environmental Considerations

Operating	Temperature -15 deg. C to +55 deg. C, Humidity up to 95%
Storage	Temperature -20 deg. C to +60 deg. C, Humidity up to 95%
IP-Rating	Protection: IP66 front - IP22 rear (EN60529)

Safety Considerations:

Even although the test conditions for bridge units provide for a maximum operating temperature of 55 °C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25 °C. This is a necessary prerequisite for long life and low service costs.

Input / Output Connectors

Connector	Rear
Primary Power 24VDC	1 x SL-SMT 90F (1 x 2 pole)
Secondary Power 24VDC	1 x SL-SMT 90F (1 x 2 pole)
LAN	1 x RJ45 (For customer)
LAN	1 x RJ45 (For C-Nav Service)
USB2.0 (<10m)	2 x Type A
Solid State Relay (NO) (over current protection)	2 x SCD 90F (2 x 2 pole) (IEC 60950 Compliant, 48VDC)
Mechanical Relay (NO/NC)	1 x SC 90F connector (1x3 pole)
COM RS-422/485 (isolated, NMEA Compliant)	1 x SC 90F connector (1 x 5 pole)
COM RS-232 (non-isolated module)	4 x 9P D-SUB Connectors

Section 11 - Specifications of Accessories

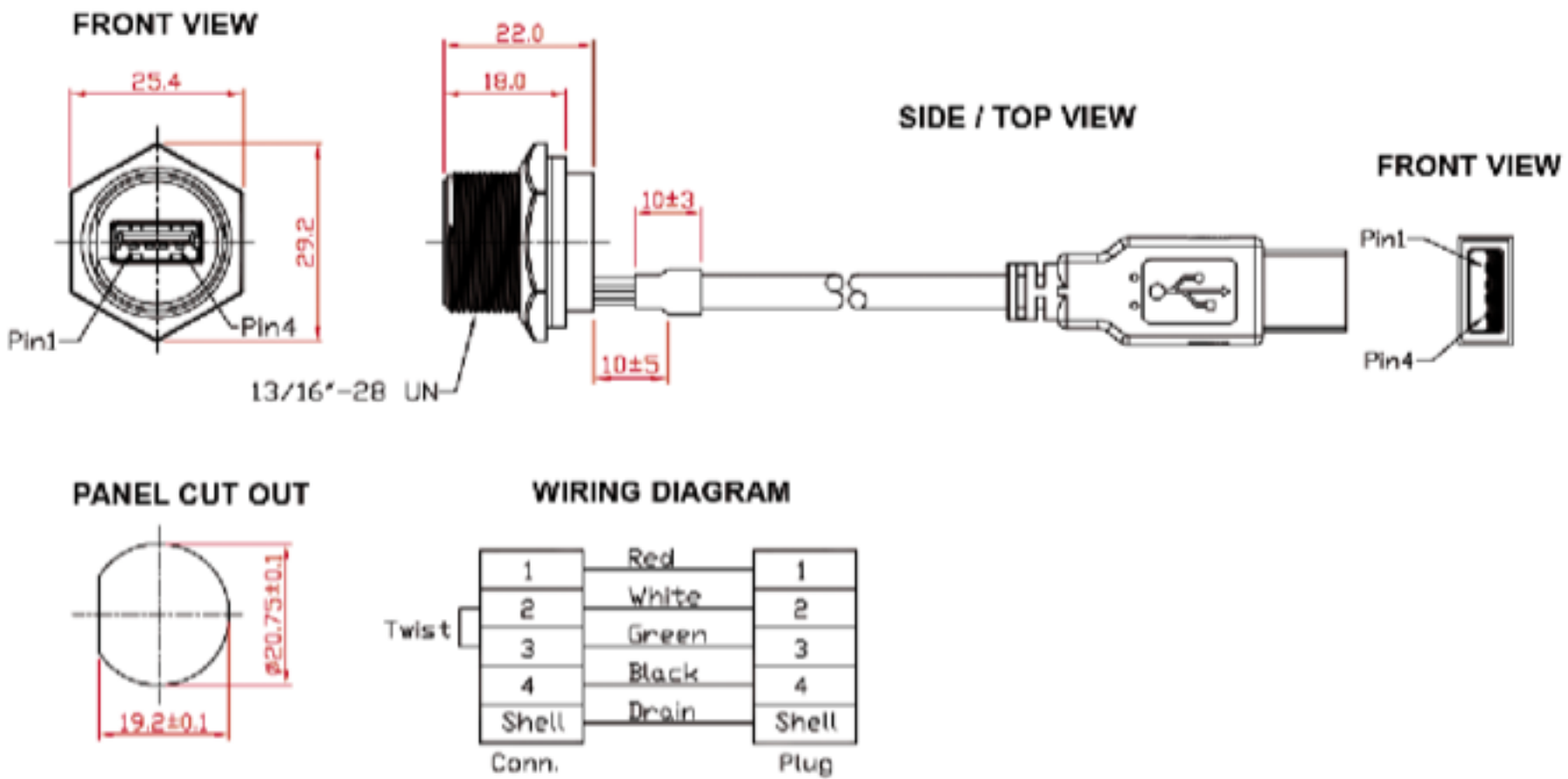
USB Cable

Description

USB Cable (Type A plug to Chassis mount Type A receptacle) suitable for installations that feature a secure fastening connection from external equipment with standard Type A ports to the C-NaviGator III standard USB Type A ports. The USB Thumb Drive, provided with the bundle, can be connected to the front panel side for saving snapshots and other data. It is in RoHS Compliance.

Specifications

Waterproof Rate	IP67
Recommended Panel Thickness	0.8 to 6.0 mm
Recommended Torque	6~7 Kgf-cm
Mating Cap P/N	GT1C533122
Over Mold	Black color PVC
USB Type A Plug	Thermal plastic, black color housing
Cable	Copper Alloy contacts with Silver plated finish Cold Roll Steel shell with Nickel plated finish 1m, UL2725 1P x 28AWG + 2C x 24AWG+Al/My+D+B, 5.0mm thickness, black color
Shrink Tube	L=10mm, Black color
Receptacle Connector	USB-A Plastic C3 Panel Jack screw with pig tail
Type Approval / Testing	Not tested, IEC60945 and IACS E10 pending



External AC-DC Power Supply

The External AC-DC Power Supply allows AC input voltages of 115VAC to 230VAC, 50-60Hz. US, UK, and EU style line cords are provided with the C-NaviGator III bundle.



AC Input Connection

There is a 24VDC output on the other side of this power supply. The 24VDC output is then connected to the Primary (Pri) input on the C-NaviGator III. A DC power cable is provided.



DC Output Connection

RS-232 COM Module

Features

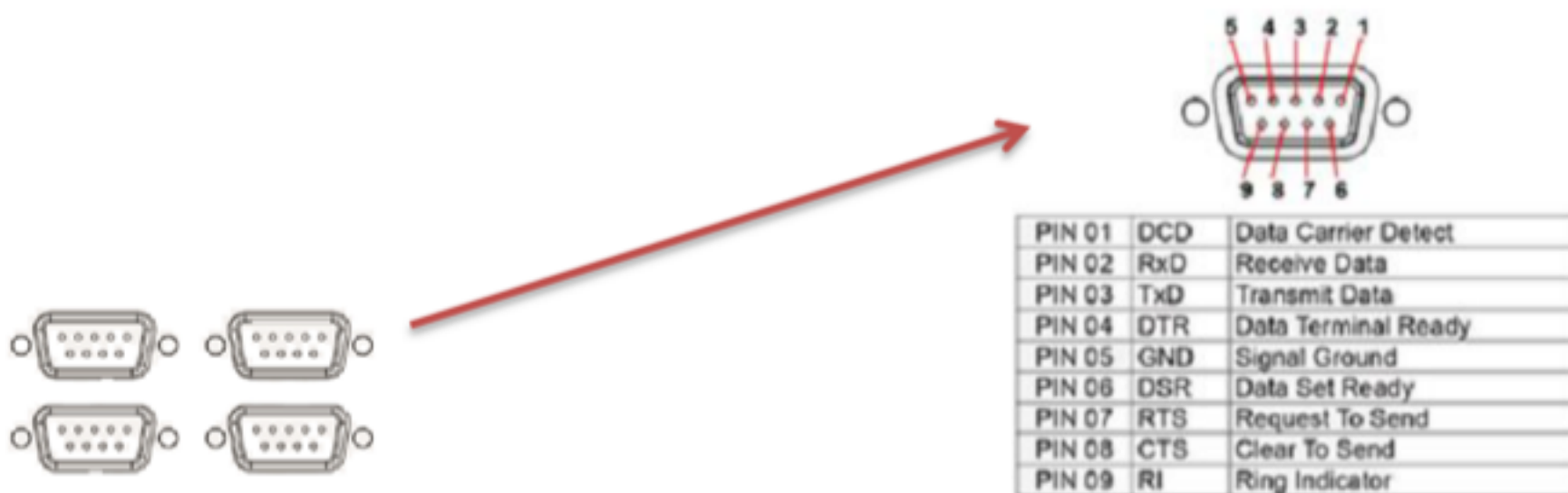
- 4 independent channels (If a card is replaced most operating systems will not change COM port number)
- Outputs are short circuit protected

Specifications

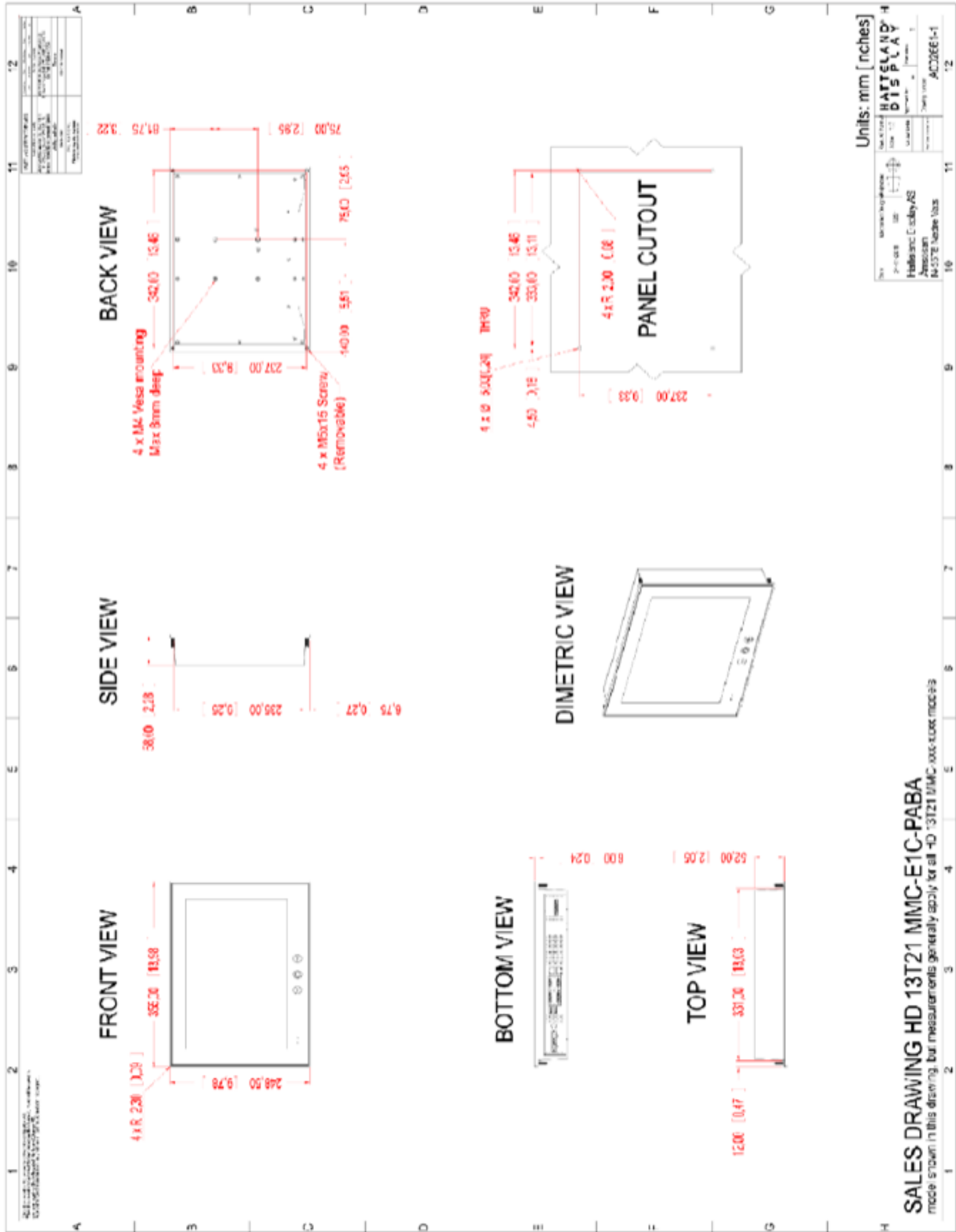
Internal USB to 4 channel x RS-232 non isolated

Features	All channels have support for all RS-232 DB-9 signals
Connector	Standard RS-232 DB-9 male housing and pinning
Data Rate	230kbps
ESD Rating (IEC 1000-4-2 Air) (RS-232 I/Os)	±15 kV
ESD Rating (IEC 1000-4-2 Contact) (RS-232 I/Os)	±8 kV

9 pin DSUB Serial COM RS-232 non-isolated

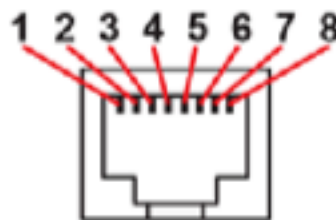


Appendix A - Mechanical Drawings



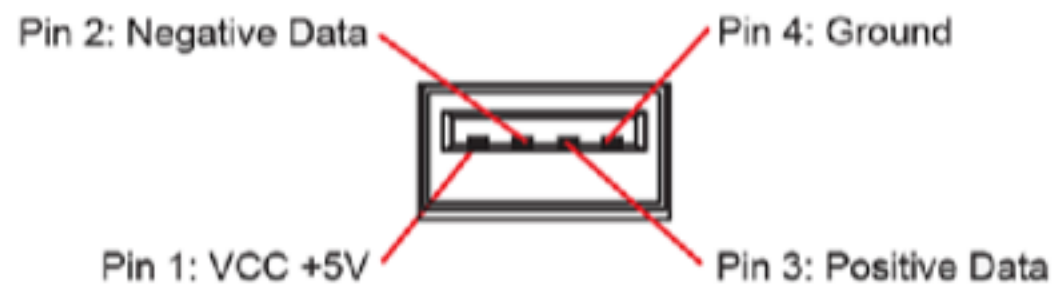
Appendix B - Pin Assignments

8 pin RJ45 10/100/1000mbps LAN/Ethernet

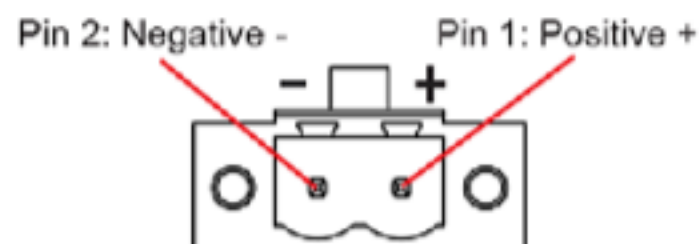


PIN 01	D0P	Differential Pair 0 (Positive)
PIN 02	D0N	Differential Pair 0 (Negative)
PIN 03	D1P	Differential Pair 1 (Positive)
PIN 04	D2P	Differential Pair 2 (Positive)
PIN 05	D2N	Differential Pair 2 (Negative)
PIN 06	D1N	Differential Pair 1 (Negative)
PIN 07	D3N	Differential Pair 3 (Positive)
PIN 08	D3N	Differential Pair 3 (Negative)

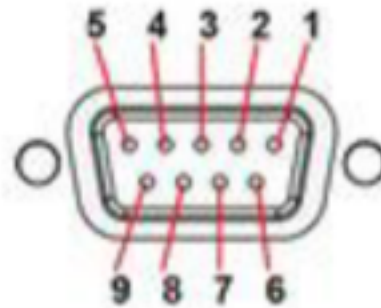
4 pin USB TYPE A



2 pin DC Power Input, Phoenix

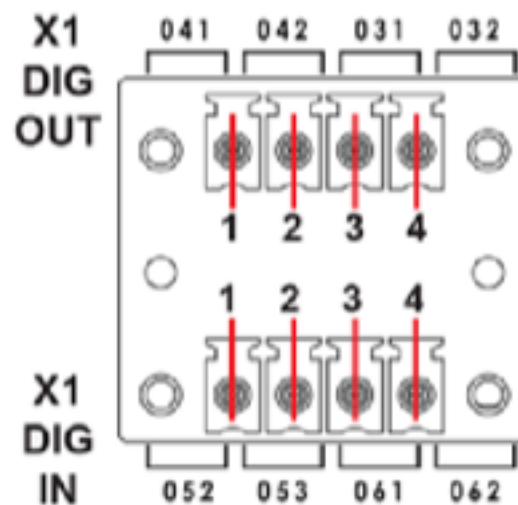


9 pin DSUB Serial COM RS-232 non-isolated



PIN 01	DCD	Data Carrier Detect
PIN 02	RxD	Receive Data
PIN 03	TxD	Transmit Data
PIN 04	DTR	Data Terminal Ready
PIN 05	GND	Signal Ground
PIN 06	DSR	Data Set Ready
PIN 07	RTS	Request To Send
PIN 08	CTS	Clear To Send
PIN 09	RI	Ring Indicator

8 pin Digital Output / Input Module
"Solid State Relay"

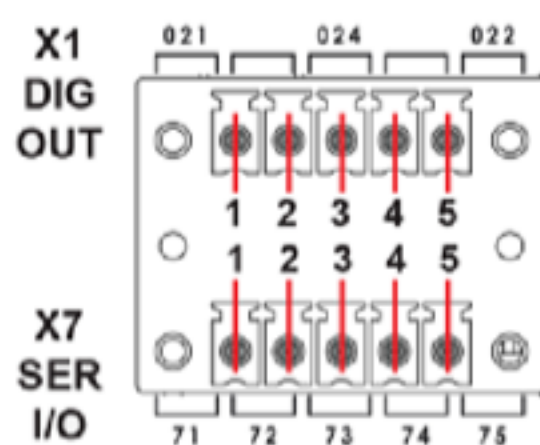


Pin 1	X1 - Out: 41	Out +
Pin 2	X1 - Out: 42	Out -
Pin 3	X1 - Out: 31	COM (Common Center Terminal) *
Pin 4	X1 - Out: 32	NC (Normally Closed)*

* IEC 60950 Compliant, 48VDC

Pin 1	X1 - In: 52	+24VDC
Pin 2	X1 - In: 53	GND (Ground)
Pin 3	X1 - In: 61	+24VDC
Pin 4	X1 - In: 62	+Input

10 pin Digital Output / Input & Serial Module
 "Mechanical Relay & COM (isolated RS-422/485)"



PIN 1	X1 - Out: 21	COM (Common Center Terminal)
PIN 2	X1 - N/C	<i>Not Connected / Not used</i>
PIN 3	X1 - Out: 24	NO (Normally Open)
PIN 4	X1 - N/C	<i>Not Connected / Not used</i>
PIN 5	X1 - Out: 22	NC (Normally Closed)

PIN 1	X7 - In: 71	Rx+ (Receive Data +)
PIN 2	X7 - In: 72	Rx- (Receive Data -)
PIN 3	X7 - Out: 73	Tx+ (Transmit Data +)
PIN 4	X7 - Out: 74	Tx- (Transmit Data -)
PIN 5	X7 - GND: 75	SGnd (Signal Ground)

Appendix C - Glossary

1PPS	(1 Pulse Per Second) A precision electronic pulse output (at TTL levels) from the GNSS receiver that marks exact second intervals (1 s). It is used for precise timing and to synchronize sensors and acquisition computers.
Azimuth	The horizontal angle of the observer's bearing in surveying, measured clockwise from a referent direction, as from the north, or from a referent celestial body, usually Polaris.
Bad Packets	The percentage of bad C-Nav correction packets received since the unit was turned on.
Bit Error Rate	Number of received bits of a data stream over a communication channel that have been altered due to noise, interference, distortion or bit synchronization errors. The Bit Error Rate is considered good if less than 20. The maximum reported value is 500.
C-Monitor	A utility program used to monitor the quality of the position information received from a GNSS receiver. No position calculations are done in C-Monitor. C-Monitor simply creates a visual representation of the data received from a GNSS unit.
C-Nav1010	The C-Nav GNSS receiver combines a dual-frequency, geodetic grade, GNSS receiver with an integrated LBAND communication RF detector and decoder -- all linked by an internal microprocessor. The entire assembly is combined into a single integrated package that is durable, lightweight and water/weatherproof.
C-Nav2000	The C-Nav2000 GNSS navigational receiver is a 10-channel dual frequency unit with two additional channels for receiving Satellite Based Augmentation System (SBAS) signals and an L-Band demodulator for reception of the C-Nav



correction service. For more information, go to www.cnav.com.

C-Nav2050

The C-Nav2050 survey GNSS receiver has expanded capabilities including RTK, 1PPS output, etc. As with the model C-Nav2000, the C-Nav2050 is a 10-channel, dual frequency, precision GNSS receiver, with two additional channels for receiving SBAS signals and an L-Band demodulator for reception of C-Nav subscription signals. Maximum data output rate is 50Hz and Position Velocity Time (PVT) data can output at 25Hz. Two 115kbps serial ports are available. For more information, go to www.cnav.com.

**C-Nav3050**

The C-Nav3050 survey GNSS receiver has expanded capabilities including RTK, 1PPS output, etc. As with other C-Nav receivers, the C-Nav3050 includes dual frequency, precision GNSS receiver, with two additional channels for receiving SBAS signals and an L-Band demodulator for reception of C-Nav subscription signals. For more information, go to www.cnav.com.

Correction Signal

The Correction Signal-to-Noise ratio. This graph is only available with the C-Nav system.

Correction Type

The type or source of differential corrections being applied to the GNSS receiver.

Course True

The course computed by the GNSS receiver.

Differential Age

The time in seconds since the GNSS unit received the last differential correction update.

Differential GPS

A technique for improving GPS solution accuracy by reducing the error based on signals received at a known location. Single point code positioning with pseudorange corrections are applied from simultaneous observations at the known position. One to ten meter accuracy is typical.

DOP	<p>Dilution of Precision is a scale factor representing the effect of satellite constellation geometry positioning accuracy. Standard terms for GNSS applications are:</p> <p>GDOP Geometric Dilution of Precision -- three coordinates plus clock offset</p> <p>PDOP Position Dilution of Precision -- three coordinates (See PDOP definition below)</p> <p>HDOP Horizontal Dilution of Precision -- two coordinates</p> <p>VDOP Vertical Dilution of Precision -- height only</p> <p>TDOP Time Dilution of Precision -- clock offset only</p>
Elevation	Height of the GNSS antenna above the reference ellipsoid.
Error Ellipse	A statistical measure of the positional error at a given point computed from the propagation of all errors affecting the position solution and expressed by its semi-major and semi-minor axis (vectors of greatest and least magnitude) and the covariance (rotation angle in the reference coordinate system). Two-dimensional errors are typically propagated at one-standard deviation (39.4% probability that the position lies on or within the ellipse) or 2.1447 times the standard deviation (95% confidence) level.
FOM	Figure of Merit
GNSS Receiver	A GNSS receiver consists of a number of basic components: an antenna with optional preamplifier, a radio-frequency and intermediate- frequency (RF/IF) "front end" section, a signal tracker / correlator section, and a micro- processor to control the receiver, process the signals, and compute the receiver's coordinates. The receiver will also include a power supply and memory devices to store instructions and data.
HAE	Height Above Ellipsoid – RTK vertical reference plane.

- L1-L2 Sig. Strength** GNSS satellites transmit spread spectrum signals in two frequency bands, L1 and L2 (1575.42 and 1223.6 MHz, respectively). The satellite signals carry both time information and a data strings, referred to as the GNSS navigation message. This message is transmitted at a rate of 50 bits per second. Using the data from 4 or more satellites, a GNSS receiver can accurately determine local latitude, longitude and height. Civilian applications are confined to the L1 band for computing position. The C & C Technologies and military receivers employ both L1 and L2 bands, offering a significant improvement in accuracy.
- NMEA 0183** This guideline for Interfacing marine electronics devices is a voluntary industry standard, first released in March of 1983. NMEA 0183 defines electrical signal requirements, data transmission protocol, timing, and specific sentence formats for up to 38.4K-baud serial data bus.
- PDOP** **Position Dilution of Precision** is the most common mathematical expression of the quality of solutions. It is based on the geometry of the satellites with the best case being a value of 1. Higher numbers indicate worse quality. The best DOP would occur with one satellite directly overhead and three others evenly spaced about the horizon. PDOP has a multiplicative effect on range error. For example, a range error of 32 meters with a PDOP of 1 would give a user an assumed best accuracy of 32 meters. A PDOP of 2 would result in an assumed accuracy of 64 meters. C-NaviGator III can be programmed to stop providing position solutions above a specific PDOP level (6 is common).
- Position** Includes Current Latitude, Longitude, Geoidal Height, HDOP, PDOP, Type of corrections, Current Station ID, Differential Age, Velocity, UTC Time and UTC Date if available.
- PPS** **Precise Positioning Service** – a positioning service that includes velocity and timing information. PPS is continuously available, worldwide to authorized users. PPS

information is usually (but not always) encrypted to prevent use by unauthorized users.

Pseudorange	<p>A measure of the apparent propagation time from the satellite to the receiver antenna, expressed as a distance. The apparent propagation time is determined from the time shift required to align a replica of the GNSS code generated in the receiver with the received GNSS code. The time shift is the difference between the time of signal reception (measured in the receiver time frame) and the time of emission (measured in the satellite time frame). Pseudorange is obtained by multiplying the apparent signal-propagation time by the speed of light. Pseudorange differs from the actual range by the amount that the satellite and receiver clocks are offset, by propagation delays, and other errors including those introduced by selective availability.</p>
PVT	Position Velocity Time
RTCM	R adio T echnical C ommission for M aritime Services) – A Commission set up to define a differential data link to relay GNSS correction messages from a monitor station to a field user. The RTCM SC-104 recommendation is the defacto standard for differential GNSS correction transmission. It defines the correction message format and 16 different correction message types.
RTG	R eal T ime G ypsy -- Developed by NASA's Jet Propulsion Laboratory (JPL) to provide centimeter-level accuracy for space applications. A single RTG subscription service, combined with C-Nav hardware, can provide you with worldwide positioning capability on the order of 0.1 meter.
RTK	R eal T ime K inematic (or Kinematic Surveying) involves a roving receiver that does not need to stop to collect precision information. Meter / centimeter level accuracy is available using modern dual-frequency carrier-phase measurement techniques.

SBAS	Satellite Based Augmentation System - Includes, but is not limited to: WAAS (Wide Area Augmentation System) and EGNOS (European Geo-stationary Navigation Overlay System). Ranging signals generated on the ground and provided via C-band (or K-band) downlink are provided to the end user. These signals contain integrity data on satellite system.
Sky Plot	This option displays a plot of the current GNSS satellite locations with reference to the GNSS receiver. C-NaviGator III refers to this presentation as "Position Information".
Scatter Plot	This option displays a plot of satellite positions relative to the receiver and provides an indication of relative signal strength in the two frequency bands.
Visible Sats	The number of Satellites used by the receiver in the position solution.
WAAS	Wide Area Augmentation Service -- A system of satellites and ground stations that provide GNSS signal corrections over a wide area. An accuracy improvement on the order of three meters, with 95 percent confidence, is realized.
WCT	Wide Area Correction Transform

Appendix D - NMEA Data Strings

The C-NaviGator III is capable of reading and writing NMEA 0183 compliant messages as they relate to positioning. Version 2.1, 3.0, and 3.01 are supported. The following table lists the available strings:

NMEA String	Description
ALM	Almanac data
GBS	GNSS Satellite Fault Detection
GRS	GPS Range Residuals
MLA	GLONASS Almanac Data
GGA	Global Positioning System Fix Data
GLL	Geographic Position – Latitude / Longitude
GNS	GNSS Fix Data
GSA	GNSS DOP and Active Satellites
GST	GNSS Pseudorange Error Statistics
GSV	GNSS Satellites in View
HDT	Heading data
RMC	Recommended Minimum Specific GNSS Data
VTG	Course Over Ground and Ground Speed
ZDA	Time & Date

In addition to standard NMEA messages, the C-NaviGator III outputs the following C-Nav proprietary sentences:

NMEA String	Description
DPGGA	Filtered GGA output for DP vessels
NAVQ	Navigation quality information
RXQ	CCS reception quality information
SATS	Sky Plot information
TRINAV	Statistical information
WGPOS	Statistical information

Appendix E - Alarm List

General Alarms

Invalid Navigation:

Valid navigation data is unavailable on the Device port. The communication link is operational.

No Communications:

C-NaviGator III can no longer communicate with the attached device.

Output Error:

Output data and / or commands from this serial port has failed.

C-Nav3050 Alarms

Correction Signal Invalid Messages:

Information received in the correction signal is missing or incorrect.

Correction Signal Lost Lock:

Input of the correction signal has failed.

Too few measurements:

The number of satellites available is too low to compute a position.

PDOP too high:

The positional dilution of precision exceeds the user-configured maximum.

Export height / velocity limits exceeded:

Input of the correction signal has failed.

Requested mode unavailable:

The settings requested are not available with the receiver's configured options.

No Valid C-Nav Corrections License :

The C-Nav Corrections Service has expired. Please contact C-Nav Support:

E-mail: support@cnav.com -or-

Phone: +1 (337) 210-0000

C-Nav Corrections License Expires Within 3 Days:

The C-Nav Corrections Service is set to expire in 3 days.

Please contact C-Nav Support:

E-mail: support@cnav.com -or-

Phone: +1 (337) 210-0000

C-Nav2050 Alarms

Correction Signal Invalid Messages:

Information received in the correction signal is missing or incorrect.

Correction Signal Lost Lock:

Input of the correction signal has failed.

Correction Signal Poor Reception:

The selected correction signal source is weak.

Low voltage x.x V:

The GNSS receiver input voltage is too low.

No Valid C-Nav Corrections License :

The C-Nav Corrections Service has expired. Please contact C-Nav Support:

E-mail: support@cnav.com -or-

Phone: +1 (337) 210-0000

C-Nav Corrections License Expires Within 3 Days:

The C-Nav Corrections Service is set to expire in 3 days.

Please contact C-Nav Support:

E-mail: support@cnav.com -or-

Phone: +1 (337) 210-0000

Unstable GPS Clock:

The GPS receiver's internal clock (time reference) has become unstable. The receiver's ability to measure pseudo ranges is compromised.

C-Nav2000 Alarms

Correction Signal Invalid Messages:

Information received in the correction signal is missing or incorrect.

Correction Signal Lost Lock:

Input of the correction signal has failed.

Correction Signal Poor Reception:

The selected correction signal source is weak.

Failed Geofence:

The C-Nav receiver is outside the Land Based correction signal area. To extend, Contact C-Nav Support for a marine license:

E-mail: support@cnav.com -or-

Phone: +1 (337) 210-0000

Firmware Update Mode:

A firmware update is in progress or has failed.

Low Voltage x.x V:

The GNSS receiver input voltage is too low.

No Valid C-Nav Corrections License :

The C-Nav Corrections Service has expired. Please contact C-Nav Support:

E-mail: support@cnav.com -or-

Phone: +1 (337) 210-0000

C-Nav Corrections License Expires Within 3 Days:

The C-Nav Corrections Service is set to expire in 3 days.

Please contact C-Nav Support:

E-mail: support@cnav.com -or-

Phone: +1 (337) 210-0000

Unstable GNSS Clock:

The GNSS receiver's internal clock (time reference) has become unstable. The receiver's ability to measure pseudo ranges is compromised.

C-Nav1010 Alarms

Correction Signal Invalid Messages:

Information received in the correction signal is missing or incorrect.

Correction Signal Lost Lock:

Input of the correction signal has failed.

Correction Signal Poor Reception:

The selected correction signal source is weak.

No Valid C-Nav Corrections License :

The C-Nav Corrections Service has expired. Please contact C-Nav Support:

E-mail: support@cnav.com -or-

Phone: +1 (337) 210-0000

C-Nav Corrections License Expires Within 3 Days:

The C-Nav Corrections Service is set to expire in 3 days.
Please contact C-Nav Support:
E-mail: support@cnav.com -or-
Phone: +1 (337) 210-0000

Unstable GPS Clock:

The GPS receiver's internal clock (time reference) has become unstable. The receiver's ability to measure pseudo ranges is compromised.

Output Alarms

Position Filtered - Max Error:

The position solution has exceeded the error allowance.

Position Filtered - Max HDOP:

The Horizontal Dilution of Precision computation has exceeded the alarm setting (See GNSS Quality Alerts).

Position Filtered - Min 2D / 3D Time:

The Min 2D / 3D time computation has exceeded the alarm setting (See GNSS Quality Alerts).

Position Filtered - Min Satellites:

The number of usable satellites has dropped below the minimum number set on the GNSS Quality Alerts screen.

Position Filtered - No Data:

Data through the C-NaviGator III active port is not present or is invalid.

Simulator Alarms

Simulator mode:



C-NaviGator III is in Simulator mode. This alarm cannot be acknowledged.

Appendix F - Approvals & Certifications

IEC & IACS

IEC 60945 4th (EN 60945:2002)

IACS E10

Bureau Veritas (BV)

Page 1 / 4



Certificate number: 29687/A0 BV

File number: AP 4316

Product code: 4484H

This certificate is not valid when presented without the full attached schedule composed of 7 sections

www.veristar.com

TYPE APPROVAL CERTIFICATE

This certificate is issued to

Hatteland Display AS
Nedre Vats - NORWAY

for the type of product

MARITIME DEDICATED COMPUTERS

Series X - Maritime Multi Computers (MMC)
HD 08T21, HD 13T21, HD 12T21, HD 15T21, HD 17T21, HD 19T21, HD 24T21 and HD 28T21

Requirements:
BUREAU VERITAS Rules for the Classification of Steel Ships
IEC 60945:2002 (4th Ed.)

This certificate is issued to attest that BUREAU VERITAS did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 13 Jul 2017

For BUREAU VERITAS,
At BV OSLO, on 13 Jul 2012,
Rune MARSTEIN

Rune Marstein



This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with BUREAU VERITAS. Should the specified regulations or standards be amended during the validity of this certificate, the product(s) issued to be re-approved prior to being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of BUREAU VERITAS Marine Division available on the internet site www.veristar.com. Any person not a party to the contract pursuant to which this document is delivered may not assert a claim against BUREAU VERITAS for any liability arising out of errors or omissions which may be contained in said document, or for acts of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION:

The Series X - Maritime Multi Computers (MMC) comprises the following models (divided in 2 groups):

HD 08T21 MMC-Exz-qrBx - 8.0" LCD

HD 13T21 MMC-Exz-qrBx - 13.3" LCD

and

HD 12T21 MMC-zA1-pqrs - 12.1" LCD

HD 15T21 MMC-zA1-pqrs - 15.0" LCD

HD 17T21 MMC-zA1-pqrs - 17.0" LCD

HD 19T21 MMC-zA1-pqrs - 19.0" LCD

HD 24T21 MMC-zA1-pqrs - 24.0" LCD

HD 26T21 MMC-zA1-pqrs - 26.0" LCD

1.1 - Common characteristics:

LCD Type:	Colour TFT LED Backlight
Processor: (Depending on the Model / Version)	Intel® Atom™ N450 - 1.66 GHz Intel® Core™ 2 Duo P8400 - 2.26 GHz Intel® Celeron P4505 - 1.86 GHz
Memory: (Depending on the Model)	DDR2 or DDR3
Storage: (Depending on the Model / Version)	2.5" SATA Solid State Disk (SSD) HDD (see § 1.3 below for supported Models)
I/O Ports: (Depending on the Model / Version)	Ethernet Gigabit LANs - RJ45 COM (RS-232, RS-422/485) USB 2.0 - Type A DVI-I RGB IN / RGB OUT Keyboard / Mouse
Power Supply: (Depending on the Model)	DC Power IN - 2x24 VDC HD 08T21 & HD 13T21, Type: AADLB4003W - 60W DC/AC Power IN - 115/230 VAC - 50/60 Hz Type: PDNO0918 used on Models 12" to 17" (except above 13") and 26" Type: L-SYS-0904-659-V1-0 used on Models 19" to 24" and 26"
Ingress Protection Index:	IP 66/22 (Front/Rear)
Operating System:	MS® Windows XP Pro, Server, 7 Pro

1.2 - Specific characteristics of LCD Displays

	Native Resolution	Response Time (ms)	Contrast Ratio	Light Intensity (cd/m ²)
HD 08T21 MMC	800x480 (WVGA)	5/11	600:1	600
HD 13T21 MMC	1280x800 (WXGA)	6/10	800:1	400
HD 12T21 MMC	1024x768 (XGA)	35 Std	700:1 Std	500 Std
HD 15T21 MMC	1024x768 (XGA)	8 Std	700:1 Std	400 Std
HD 17T21 MMC	1280x1024 (SXGA)	5	1000:1	350
HD 19T21 MMC	1280x1024 (SXGA)	20	1000:1	300
HD 24T21 MMC	1920x1080 (FHD)	25	3000:1	250
HD 26T21 MMC	1920x1200 (WUXGA)	8	1500:1	350

1.3 - SSD and HDD:

Manufacturer	Type	Description	Size
Toshiba	MK2565GSX	Standard 2.5" HDD	250 GB
Fujitsu	MHW2080BH	Standard 2.5" HDD	80 GB
Fujitsu	MHZ2120BH	Standard 2.5" HDD	120 GB
PQI	SSM PQI S982-II	SSD Module	64 GB
Transcend	TS16GSSD25S	SSD 2.5"	16 GB
Transcend	TS32GSSD25S-M	SSD 2.5"	32 GB
Transcend	TS128GSSD25S-M	SSD 2.5"	128 GB

1.4 - Accessories for Series X MMC:

Product	Description
IIT 00254 OP1-A1	USB to CAN
PCA100293	USB to RS422-485
PCA100294	USB to RS232

1.5 - BIOS / Firmware Versions:

	Mainboard	Watchdog	Touch
HD 08T21 MMC	V0.6	110114ROV01	MILDEX_8p0_17x27_72E1v1005_f02_nspdsab
HD 13T21 MMC	V0.6	100909ROV01	MILDEX_13_4_28x48_72E2v1005_f02_npsab
HD 12T21 MMC	C051Z120.ROM	GDC_120110_0xAF41.hex	N/A
HD 15T21 MMC			
HD 17T21 MMC			
HD 19T21 MMC			
HD 24T21 MMC			
HD 26T21 MMC			

2. DOCUMENTS AND DRAWINGS:**HATTELAND:**

User Manual, Series X - Maritime Multi Computers Models, Doc. INB100485-1 (Rev. 4), dated 14 Mar. 2012.

User Manual, Series X - Maritime Multi Computers Models, Doc. INB100485-2 (Rev. 2), dated 14 Mar. 2012.

Data Sheets:

HD 08T21 MMC xxx-xxxx, Doc Rev. 03 dated 02 Mar. 2012

HD 13T21 MMC-xxx-xxxx (2 Models), Doc Rev. 03 dated 01 Mar. 2012 and Doc. Rev. 02 dated 02 Mar. 2012

HD 12T21 MMC xxx-xxxx, Doc Rev. 03 dated 01 Mar. 2012

HD 15T21 MMC-xxx-xxxx, Doc Rev. 03 dated 01 Mar. 2012

HD 17T21 MxC xxx-xxxx, Doc Rev. 03 dated 01 Mar. 2012

HD 19T21 MxC-xxx-xxxx, Doc Rev. 03 dated 01 Mar. 2012

HD 24T21 MxC-xxx-xxxx (2 Models), Doc Rev. 02 dated 07 Dec. 2011 and Doc. Rev. 05 dated 20 Mar. 2012

HD 26T21 MxC-xxx-xxxx, Doc Rev. 04 dated 07 Jun. 2012

Series x Panel Computers - Type Number Overview, Doc. IND100780-4-Rev 04 dated 02 Mar. 2012

CAN Module with CO-Processor, Doc Rev. 02 dated 23 May 2011

COM Module RS-422 / RS-485, Doc Rev. 04 dated 14 Mar. 2012.

Letter LET_BV20120524AK dated 24.05.2012, Type Approval request for Maritime stand-alone Computers, Displays and Panel Computers.

3. TEST REPORTS:**DNV Technical Reports:**

EMC & Environmental Testing - HD 13T21 STD, Report No. 2011-3497 Rev. 01, dated 2011.11.28

EMC & Environmental Testing - HD 08T21 MMC, Report No. 2011-3496 Rev. 01, dated 2011.11.29

EMC & Environmental Testing - HD 15T21 STD, Report No. 2012-3081 Rev. 01, dated 2012.02.29

EMC & Environmental Testing - HD 17T21 STD, Report No. 2011-3545 Rev. 01, dated 2012.02.24

EMC & Environmental Testing - HD 19T21 MMD, Report No. 2011-3438 Rev. 01, dated 2012.02.14

EMC & Environmental Testing - HD 23T14 MMD, Report No. 2010-3124 Rev. 03, dated 2010.04.20

EMC & Environmental Testing - HD 24T21 MMD, Report No. 2011-3481 Rev. 01, dated 2012.04.11

EMC & Environmental Testing - HD 24T21 MMC, Report No. 2011-3475 Rev. 01, dated 2011.11.24

EMC & Environmental Testing - HD 26T21 MMD, Report No. 2011-3396 Rev. 01, dated 2011.09.29

EMC & Environmental Testing - HT C01 STD, Report No. 2011-3165 Rev. 01, dated 2011.06.11

EMC Testing - HT B21EA STD, Report No. 2012-3095 Rev. 01, dated 2012.05.09

EMC & Environmental Testing of Maritime Computer - HT B18, Report No. 2009-3601 Rev. 5, dated 2010.03.11

EMC Testing of HT B08CD, Report No. 2008-3319 Rev. 1, dated 2008.06.23

Vibration Testing - HD 15T17 MMC, Report No. 2011-3430 Rev. 01, dated 2011.10.18.

Nemko:

EMC Test Report - HT B21EA STD, Report No. E11201.01, dated 2012.01.03.

Note: Above equipment was tested and Approved according to IEC 60945 4th edition (except Salt-Mist Test not carried out).

4. APPLICATION / LIMITATION:

- 4.1 - BUREAU VERITAS Rules for the Classification of Steel Ships and IEC 60945.
- 4.2 - Approval valid for ships intended to be granted with the following additional class notations: AUT-UMS, AUT-CCS, AUT-PORT and AUT-IMS.
- 4.3 - BUREAU VERITAS Environmental Category, EC Code: 21
- 4.4 - The equipment fulfils the EMC requirements for installation on the Bridge and Deck Zone.
- 4.5 - To be flush mounted.
- 4.6 - Only Hardware and Firmware successfully tested together in compliance with the regulations as referred to in page one, according to the declaration of the manufacturer are covered by this certificate.
- 4.7 - The Panel Computers intended for the presentation of navigation-related information on the bridge of a ship shall be tested according to the requirements of IEC 62288.

5. PRODUCTION SURVEY REQUIREMENTS:

- 5.1 - The **Series X - Maritime Multi Computers MMC** are to be manufactured, examined and tested by **Hatteland Display AS** in accordance with the type described in this certificate and Bureau Veritas Rules for the Classification of Steel Ships.
- 5.2 - Production sites are to be recognized by Bureau Veritas as per NR320 for IIBV products. To this end **Hatteland Display AS** has to make the necessary arrangements for a Society's Surveyor to perform visits and product audits at the production sites.
- 5.3 - **Hatteland Display AS** has declared to Bureau Veritas that the type of product described in this certificate are manufactured at the following production site:

Hatteland Display AS
Åmsosen
N-5578 Nedre Vats
NORWAY

6. MARKING OF PRODUCT:

According to IEC 60945.

7. OTHERS:

This approval is given on the understanding that the Society reserves the right to require check tests to be carried out on the units at any time, and that **Hatteland Display AS, Åmsosen, N-5578 Nedre Vats, NORWAY** will accept full responsibility for informing shipbuilders, shipowners or their sub-contractors of the proper methods of use and general maintenance of the units and the conditions of this approval.

*** END OF CERTIFICATE ***

DET NORSKE VERITAS (DNV)



DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. **A-12838**

This is to certify that the
Personal Computer

with type designation(s)
Maritime Multi Computer - Series X

Manufactured by
Hatteland Display AS
NEDRE VATS, Norway

is found to comply with
Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards

Application
Location classes:

Temperature	A*
Humidity	B
Vibration	A
EMC	B
Enclosure	A / IP22, B / IP66**

* Low temperature tested at -15 °C
** IP66 when sealed to console

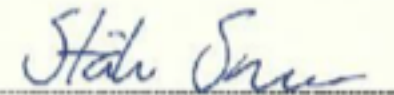
Hovik, 2012-07-13
for Det Norske Veritas AS


Odd Magne Nesvåg
Head of Section



DNV local office:
Haugesund

This Certificate is valid until
2016-12-31


Ståle Sneen
Surveyor *makri*

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.
If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.



Certificate No.: A-12838
 File No.: 899.30
 Job Id.: 262.1-013812-1

Product description

Maritime Multi Computer – Series X, comprising the following models:

Type	Description	Power supply options	Standard compass safe distance	Steering compass safe distance
HD 08T21 MMC	MMC Series X Compact	24VDC	45 cm	25 cm
HD 13T21 MMC	MMC Series X Compact	24VDC	80 cm	45 cm
HD 12T21 MMC	MMC Series X	115/230VAC – 50/60Hz + 24VDC	40 cm	20 cm
HD 15T21 MMC	MMC Series X	115/230VAC – 50/60Hz + 24VDC	55 cm	40 cm
HD 17T21 MMC	MMC Series X	115/230VAC – 50/60Hz + 24VDC	115 cm	70 cm
HD 19T21 MMC	MMC Series X	115/230VAC – 50/60Hz + 24VDC	70 cm	45 cm
HD 24T21 MMC	MMC Series X	115/230VAC – 50/60Hz + 24VDC	115 cm	70 cm
HD 26T21 MMC	MMC Series X	115/230VAC – 50/60Hz + 24VDC	125 cm	80 cm

Accessories:

Product name	Description	Test report reference
IIT 00254 OPT-A1	USB to CAN	2011-3496, E11201.01
PCA1002P93	USB to RS422/485 Module	2011-3475

SSD and HDD:

Manufacturer	Type	Description	Size
Toshiba	MK2566GSX	Standard 2.5" HDD	250 GB
Fujitsu	MHW2080BH	Standard 2.5" HDD	80 GB
Fujitsu	MHZ2120BH	Standard 2.5" HDD	120 GB
PQI	S5M PQI S982-II	Disk On Chip Module	64 GB
Transcend	TS16GSSD25S	SSD 2.5"	16 GB
Transcend	TS8GSSD25S-M	SSD 2.5"	32 GB
Transcend	TS128GSSD26S-M	SSD 2.5"	128 GB

The type approved configurations are described by the respective data sheets.

Place of manufacture

Hatteland Display
 5578 Nedre Vats, Norway

Application/Limitation

The Type Approval covers hardware listed under Product description. When the hardware is used in applications to be classed by DNV, documentation for the actual application is to be submitted for approval by the manufacturer of the application system in each case. Reference is made to DNV Rules for Ships Pt.4 Ch.9 Control and Monitoring Systems.

Product certificate

Each delivery of the application system is to be certified according to Pt.4 Ch.9 Sec.1. The certification test is to be performed at the manufacturer of the application system according to an approved test program before the system is shipped to the yard. After the certification the clause for application software control will be put into force.

Clause for application software control

All changes in software are to be recorded as long as the system is in use on board. The records of all changes are to be forwarded to DNV for evaluation and approval. Major changes in the software are to be approved before being installed in the computer.

Type Approval documentation

Typenumber Overview: IND100780-4 Rev.04, dated 2012-03-02 – (Series X Panel Computers)
 User manuals: INB100485-1 Rev.1, dated 2012-03-14 – (MMC Series X)
 INB100485-2 Rev.2, dated 2012-03-14 – (MMC Series X Compact)
 Data sheets: DS HD 08T21 MMC-xxx-xxxx Rev.03, dated 2012-03-02
 DS HD 12T21 MMC-xxx-xxxx Rev.03, dated 2012-03-01
 DS HD 13T21 MMC-xxx-xxxx_atom-n450 Rev.03, dated 2012-03-02
 DS HD 13T21 MMC-xxx-xxxx_core-p8400 Rev.03, dated 2012-03-01



Certificate No.: A-12838
File No.: 800 30
Job Id.: 262.1-013612-1

DS HD 15T21 MMC-xxx-xxxx Rev.03, dated 2012-03-01
DS HD 17T21 MxC-xxx-xxxx Rev.03, dated 2012-03-01
DS HD 19T21 MxC-xxx-xxxx Rev.03, dated 2012-03-01
DS HD 21T21 MxC-xxx-xxxx Rev.05, dated 2012-03-20
DS HD 20T21 MxC-xxx-xxxx Rev.05 preliminary, dated 2012-07-09
DS CAN Module with CO-Processor Rev.02, dated 2011-05-23
DS COM Module BS-422 / BS-485 (PCA100265-1) Rev.04, dated 2012-03-14

Sales drawings:
A002418-1 Rev.1, dated 2011-07-06 – (HD 24T21 MMC-M1D-AABA)
A002661-1 Rev.1, dated 2011-12-01 – (HD 19T21 MMC-MX1-OABA)
A002645-1 Rev.1, dated 2011-11-24 – (HD 08T21 MMC-E1C-PABA)
A002654-1 Rev.1, dated 2011-12-01 – (HD 12T21 MMC-MJF-AABA)
A002661-1 Rev.1, dated 2011-11-24 – (HD 13T21 MMC-E1C-PABA)
A002667-1 Rev.1, dated 2012-03-01 – (HD 13T21 MMC-E3A-PABA)
A002671-1 Rev.1, dated 2011-11-30 – (HD 15T21 MMC-MJF-MABA)
A002660-1 Rev.1, dated 2011-12-02 – (HD 17T21 MMC-MJD-MABA)
A002750-1 Rev.1 preliminary, dated 2012-03-04 – (HD 20T21 MMC-MJD-AABA)

Test reports:
Technical report 2010-3124, Rev.03, dated 2011-02-22 – (IH 23T14 MMD-MA1-Axxx)
Technical report 2011-3395, Rev.02, dated 2012-07-11 – (IH 25T11 MMD-MA1-AOBC)
Technical report 2011-3418, Rev.01, dated 2011-10-14 – (HD 13T21 KMD-DR1-CORP)
Technical report 2011-3475, Rev.01, dated 2011-11-24 – (HD 24T21 MMC-MJD-AAB2)
Technical report 2011-3481, Rev.01, dated 2012-04-11 – (HD 24T21 MMD-MA1-FAGA)
Technical report 2011-3495, Rev.03, dated 2012-07-11 – (HD 08T21 MMC-E1C-PABA)
Technical report 2011-3497, Rev.02, dated 2012-07-10 – (HD 13T21 STD-FA1-FAGP)
Technical report 2012-01-01, Rev.01, dated 2012-01-03 – (H1 B21EA SIC-ASS-E100)
Technical report 2011-3545, Rev.01, dated 2012-02-24 – (HD 17T21 STD-MA1-FAGA)
Technical report 2012-0001, Rev.01, dated 2012-02-29 – (HD 15T21 STD-MA1-FAGA)
Technical report E12086.01, Rev.01, dated 2012-06-15 – (HD 12T21 MMC-MVF-AABA)
Technical report 2012-3302, Rev.02, dated 2012-07-13 – (HD 19T21 MMD-MA1-FAGA)

Tests carried out

Applicable tests according to Standard for Certification No. 2.4, April 2006.
Applicable tests for protected equipment according to IEC 60945, 4th edition (2002).

Certificate Retention Survey

The scope of the retention/renewal survey is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the survey are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

Retention survey is to be performed at least every second year and at renewal of this certificate.

END OF CERTIFICATE

American Bureau of Shipping (ABS)

Certificate Number: 12-LD908273-1-PDA



Confirmation of Product Type Approval 30/AUG/2012

Please refer to the "Service Restrictions" shown below to determine if Unit Certification is required for this product.

This is to certify that, pursuant to the Rules of the American Bureau of Shipping (ABS), the manufacturer of the below listed product held a valid Manufacturing Assessment (MA) with expiration date of 28/AUG/2013. The continued validity of the Manufacturing Assessment is dependent on completion of satisfactory audits as required by the ABS Rules.

And; a Product Design Assessment (PDA) valid until 11/JUL/2017 subject to continued compliance with the Rules or standards used in the evaluation of the product.

The above entitle the product to be called Product Type Approved.

The Product Design Assessment is valid for products intended for use on ABS classed vessels, MODUs or facilities which are in existence or under contract for construction on the date of the ABS Rules used to evaluate the Product.

ABS makes no representations regarding Type Approval of the Product for use on vessels, MODUs or facilities built after the date of the ABS Rules used for this evaluation.

Due to wide variety of specifications used in the products ABS has evaluated for Type Approval, it is part of our contract that, whether the standard is an ABS Rule or a non-ABS Rule, the Client has full responsibility for continued compliance with the standard.

HATTELAND DISPLAY AS

Model Name(s): Series X Maritime Multi Computers, Model Numbers: HD 08T21 MMC, HD 12T21 MMC, HD 13T21 MMC, HD 15T21 MMC, HD 17T21 MMC, HD 19T21 MMC, HD 24T21 MMC, HD 26T21 MMC

Presented to:
HATTELAND DISPLAY AS
AMSOSEN
NEORE VATG
Norway

Intended Service:	Panel Computer for Marine applications.
Description:	Panel Computer with AC&DC power input and with a choice of Intel Celeron P4805, Atom N450, Intel I7-620LE or C2D 2.26 GHz processor. Accessories: HT 00254 OPT-A1 (USB to CAN), PCA100203 (RS422-485 Module) , PCA100284 (USB to RS232 Module)
Rating:	Operating Temp: -15C to +55C IP Rating: IP66 (front) - IP22 (rear) Models HD 08T21 MMC and HD 13T21 MMC: +24VDC All other models: +24V DC / 115V/230V AC
Service Restrictions:	The computer units will require Unit Certification if intended for use in any machinery monitoring and directional functions onboard an ABS classed vessel, MODU or facility. Unit certification could be performed individually or as an integrated system.
Comments:	Not Applicable
Notes / Documentation:	This Product Design Assessment (PDA) is valid only for products intended for use on ABS classed vessels, MODUs or facilities which are in existence or under contract for construction on the date of the ABS Rules used to evaluate the Product.
Term of Validity:	This Product Design Assessment (PDA) Certificate 12-LD908273-1-PDA, dated

17/Aug/2012 remains valid until 11/JUL/2017 or until the Rules or specifications used in the assessment are revised (whichever occurs first). This PDA is intended for a product to be installed on an ABS classed vessel, MODU or facility which is in existence or under contract for construction on the date of the ABS Rules or specifications used to evaluate the Product. Use of the Product on an ABS classed vessel, MODU or facility which is contracted after the validity date of the ABS Rules and specifications used to evaluate the Product, will require re-evaluation of the PDA. Use of the Product for non ABS classed vessels, MODUs or facilities is to be to an agreement between the manufacturer and intended client.

ABS Rules: The Manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product. The Rules applicable to this assessment are: ABS Rules for Building and Classing Steel Vessels (2012) 1-1-4/7.7, 4-9-7/13.1, 4-8-7/Tables 9 & 10

National Standards:
International Standards: IACS UR E10 2006 Rev.5, IEC/EN 60945, EN 55022 2006+A1 2007, EN 55024, EN 61000-3-2 2006+A1:2009+A2:2009, EN 61000-3-3 2008

Government Authority:
EUMED:
Others:

Model Certificate	Model Certificate No	Issue Date	Expiry Date
PDA	12-LD908273-1-PDA	17/AUG/2012	11/JUL/2017

Robert J. Vienneau

ABS Programs

ABS has used due diligence in the preparation of this certificate and it represents the information on the product in the ABS Records as of the date and time the certificate was posted. Type Approval requires Drawing Assessment, Prototype Testing and assessment of the manufacturer's quality assurance and quality control arrangements. Limited circumstances may allow only Prototype Testing in satisfy Type Approval. The approval of Drawings and Products remains valid as long as the ABS Rules, to which they were assessed, remains valid. ABS cautions manufacturers to review and maintain compliance with all other specifications to which the product may have been assessed. Further, unless it is specifically indicated in the description of the product, Type Approval does not necessarily waive witnessed inspection or survey procedures (where otherwise required) for products to be used in a vessel, MODU or facility intended to be ABS classed or that is presently in class with ABS. Questions regarding the validity of ABS Rules or the need for supplemental testing or inspection of such products should, in all cases, be addressed to ABS.

Germanischer Lloyd (GL)

Type Approval Certificate



This is to certify that the undomated product(n) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No. 47 836 - 12 HH

Company Hatteland Display AS
Amsoen
5573 Nedre Vata, NORWAY

Product Description Maritime Multi Computer
Series 1 Models and Series X Models

Type HD..T.. MMC

Environmental Category G; EMC1

Technical Data / Range of Application

Series 1 Models	
JH 15T17 MMC	+24V DC or 115/230V AC
Series X Models	
HD 08T21 MMC	+24V DC
HD 12T21 MMC	+24V DC / 115V/230V AC
HD 13T21 MMC	+24V DC
HD 15T21 MMC	+24V DC / 115V/230V AC
HD 17T21 MMC	+24V DC / 115V/230V AC
HD 19T21 MMC	+24V DC / 115V/230V AC
HD 24T21 MMC	+24V DC / 115V/230V AC
HD 26T21 MMC	+24V DC / 115V/230V AC

Accessories for Series X Maritime Multi Computers
HT 30254 OPT-A1 CAN Module
PCA100293 USB to RS422-485 Module

Test Standard Guidelines for the Performance of Type Approvals VI-7-2 Edition 2003
Regulations for the Use of Computers and Computer Systems

Documents Test reports and Documentation in Reference List
LET_GL20110323AK.DOC- rev1 dated 23-05-2012

Remarks None

Valid until 2017-09-19

Page 1 of 2
File No. 1 B-03
Hamburg, 2012-11-02

Type Approval Symbol



Germanischer Lloyd

Marco Rinkel

Andrea Grun

This certificate is issued on the basis of 'Guidelines for the Performance of Type Approvals Part 1, Product'

Type Approval Certificate



This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No. 47 836 - 12 HH

Company Hatteland Display AS
Amsoen
5573 Nedre Vata, NORWAY

Product Description Maritime Multi Computer
Series 1 Models and Series X Models

Type HD.T. MMC

Environmental Category C; EMC1

Technical Data / Range of Application

Series 1 Models	
JH 15T17 MMC	+34V DC or 115/230V AC
Series X Models	
HD 08T21 MMC	+24V DC
HD 12T21 MMC	+24V DC / 115V/230V AC
HD 13T21 MMC	+24V DC
HD 15T21 MMC	+24V DC / 115V/230V AC
HD 17T21 MMC	+24V DC / 115V/230V AC
HD 19T21 MMC	+24V DC / 115V/230V AC
HD 24T21 MMC	+24V DC / 115V/230V AC
HD 26T21 MMC	+24V DC / 115V/230V AC

Accessories for Series X Maritime Multi Computers
HT 00254 OPT-A1 CAN Module
PCA100293 USB to RS422-485 Module

Test Standard Guidelines for the Performance of Type Approvals VI-7-2 Edition 2005
Regulations for the Use of Computers and Computer Systems

Documents Test reports and Documentation in Reference List
LET_GL20110523AK.DOC- rev1 dated 23-05-2012

Remarks None

Valid until 2017-09-19

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File No. 1 B-03

Hamburg, 2012-11-02

Germanischer Lloyd

Marco Rinkel

Andrea Grun

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1, Procedure".

Type Approval Symbol



Appendix G - Declaration of Conformity

**HATTELAND®
DISPLAY**

Declaration of Conformity

We, manufacturer, **Hatteland Display AS**
Åmsosen, N-5578 Nedre Vats, Norway

declare under our sole responsibility that the
JH MMD, JH MMC, JH STD, JH MIL, HM NMD, HM MIL, HM CMD, HT STD, HD MMD, HM MMD, HT MMC
and LD MMC product ranges is in conformity with the following standards in accordance with the EMC Directive.

Low Voltage Directive 2006/95/EC
EN 60950

EMC Directive 2004/108/EC
EN 55022 Class A
EN 55024

Signature: 
Frode Grindheim
Vice President Product Management
Nedre Vats, Norway

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Arne Kristiansen
Site Manager - Test & Commission Division
Oslo, Norway



CE MARK FIRST AFFIXED DATE: (11 March 2010)

**HATTELAND®
DISPLAY**


Declaration of Conformity

We, manufacturer, **Hatteland Display AS**
Åmsosen, N-5578 Nedre Vats, Norway

declare under our sole responsibility that the products listed below comply with
FCC 47 CFR Part 15, Subpart B, Class A:

JH MMD, JH MMC, JH STD, JH MIL, HM NMD, HM MIL, HM CMD,
HT STD, HD MMD, HM MMD, HT MMC and LD MMC product ranges.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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FCC MARK FIRST AFFIXED DATE: (16 February 2012)

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