

# StarPac™ User Guide



The image is a composite of three parts. The top left shows a white survey aircraft on a tarmac. The top right shows a close-up of a surveying instrument mounted on a vehicle. The bottom part shows a computer monitor displaying the "VueStar" software interface, which includes the text "The Aerial Survey Navigation Solution" and the NAVCOM logo. In front of the monitor is a black electronic device with several ports and a mouse.

**NAVCOM**  
A John Deere Company

**StarPac**  
*Aerial Survey*

*Mission Software*

## NavCom Technology, Inc.

20780 Madrona Avenue  
Torrance, CA 90503  
USA

Tel: +1 310.381.2000

Fax: +1 310.381.2001

[sales@navcomtech.com](mailto:sales@navcomtech.com)

[www.navcomtech.com](http://www.navcomtech.com)





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## Notices

StarPac User Guide

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

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## Global Positioning System

*Selective availability (S/A code)* was disabled on 2<sup>nd</sup> May 2000 at 04:05 UTC. The United States government has stated that present *GPS* users do so at their own risk. The US Government may at any time end or change operation of these satellites without warning.

The U.S. Department of Commerce Limits Requirements state that all exportable *GPS* products contain performance limitations so that they cannot be used to threaten the security of the United States. Access to satellite measurements and navigation results will be limited from display and recordable output when predetermined values of velocity and *altitude* are exceeded. These threshold values are far in excess of the normal and expected operational parameters of the NCT-2100 *GPS* Sensor.

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## Use of this Document

This User Guide is intended for use by someone familiar with the concepts of *GPS* and satellite surveying equipment.



*Note indicates additional information to make better use of the product.*



Indicates a caution, care, and/or safety situation.

## Chapter 1

## Introduction

StarPac™ is a customized version of Waypoint's GrafNav software package, providing several user-friendly tools for aerial survey applications. StarPac™ enables users to parse through logged mission data containing StarFire™ positions and export them into the appropriate format required by post-mission tools (e.g. mapping software). StarPac™ also interpolates positions based on event records triggered by aerial Photogrammetry cameras and other external devices. Additional features and tools included are mission planning, RINEX conversion, datum conversion, trajectory plotting and Quality/Figure of Merit for each position.

StarPac™ will take NavCom binary data records and convert them into Waypoint readable files according to the chart below.

Description of Records	NavCom Messages	Waypoint Format
Measurement Records	xB0	.GPB
Ephemeris Records	x81	.EPP
Event Records	xB4	.STA
StarFire Position Records	xB1	.FSP
Almanac Records	x44	.EPP

Table 1: NavCom Binary to Waypoint file conversion

StarPac™ has the capability to connect to the VueStar™ receiver and download files directly from the internal multi-media card (MMC), or import a logged data file stored locally. Once NavCom binary data is converted into StarPac™ readable file extensions, the user can import the files into the workspace and chart the StarFire™ trajectory data (.FSP file) as well as overlay event records (.STA) and export the results into the available output forms.

## Purpose of This Document

StarPac™ has several functions that are identical to or limited versions of options available in Waypoint's GrafNav software program. This user guide focuses on steps and information regarding features that are **exclusive** to the StarPac™ program. This StarPac™ User Guide when used in conjunction with Waypoint Consulting Inc's User's Manual for GrafNav/GrafNet, GrafNav Lite, GrafMov and Inertial Explorer combine (Waypoint User Guide) provides the user with a complete ensemble of technical information required to utilize all features within the StarPac™ software. Any features that are included in both StarPac™ as well as Waypoint's GrafNav are not include herein and it is recommended that users use the Waypoint User Guide as a resource for information regarding these features. The Waypoint User Guide is included as part of the StarPac™ program and can be located under the **Help** menu.

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## Chapter 2

## Getting Started (Installation)

Begin installation by running the StarPac™ Setup executable file. The default location for the program will be in the program files directory. Follow the onscreen instructions to complete installation.

After installation is complete a StarPac™ folder will be added to the Programs section of the Start Menu. There are 4 program options.

1. Copy User Files
2. Data Extraction
3. StarPac
4. Upgrade Hardware Lock

In order for Programs 1-3 to load correctly, the USB Hardware key must be attached to a USB port on the system running the program. If the Hardware key is not attached or if there is a problem with the USB Port that is not allowing the Hardware key to work, the error message in figure 1.1 will display.

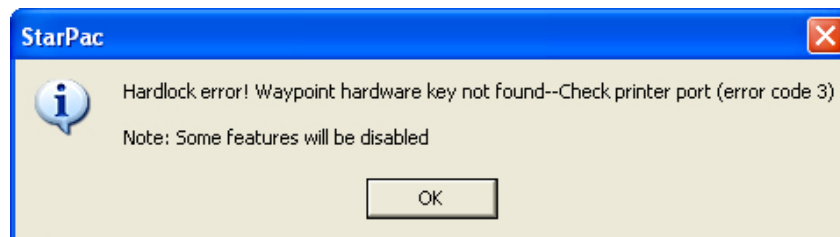


Figure 2.1: Hardware Key Error Message

If this error message appears recheck that the correct hardware key is connected to an available USB port. If the hardware key is correctly attached there may be a problem with the USB Port, or the system itself, please consult your computer hardware reference manual to troubleshoot this problem.



*For information on the programs: Upgrade Hardware Lock and Copy User Files, please consult the Waypoint User Guide located in under the Help menu option*

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## Chapter 3

## Extracting Data

In order to execute the NavCom Data Extraction utility select:

**Windows Start button > Programs > StarPac > Data Extraction**

This program is also available within the StarPac™ program by clicking the NavCom logo button on the toolbar (Figure 3.1), or by selecting **File> Extract NavCom.** (Figure 3.2)



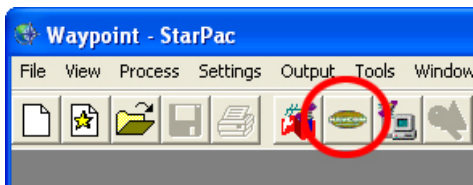


Figure 3.1 Extract NavCom Icon

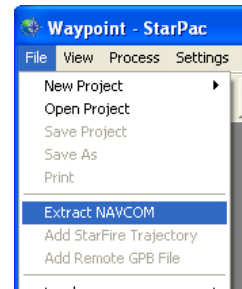


Figure 3.2: Extract NavCom Option

The default settings for the dialogue box are shown in Figure 3.3. StarPac™ will decode a data file that is already downloaded from a NavCom receiver or a file stored internally in a receiver's MMC.

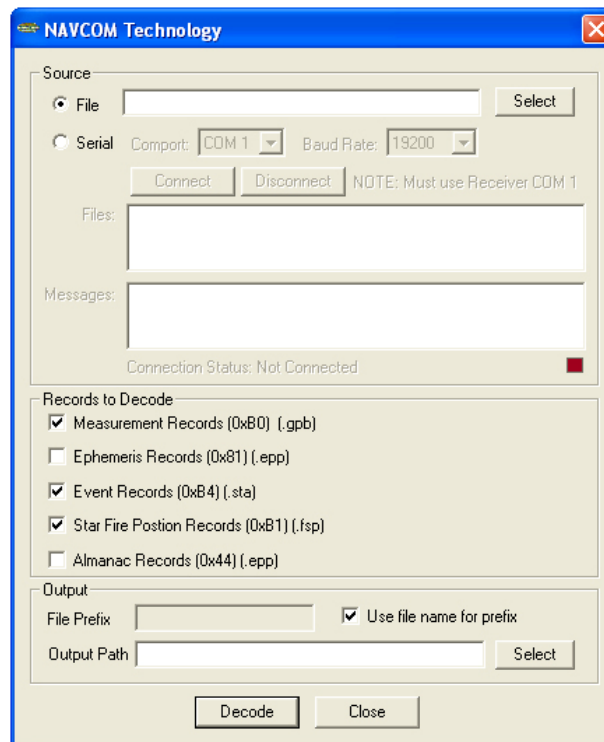


Figure 3.3: Extract NavCom Window

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## Using Logged Data for Conversion



If the data needing conversion has already been logged to a computer as a Raw Binary NavCom data file, it can be imported into StarPac™ for conversion using the **Select** button in the upper right corner of the menu (Figure 3.3) and then locate the directory in which the data file is stored.

---

## Downloading Data From an Attached Receiver

If the data needing conversion is stored inside the internal MMC of the receiver, this utility can download the file directly from the receiver.

- Attach the receiver to the computer using the receiver's serial cable. Connect the LEMO connector of the serial cable to communications port 1 (COM 1) of the receiver, and the other serial connector to an available serial port on the computer.

-  *Make sure the receiver is powered **ON** before attempting to download files.*
-  *In order for a connection to be made the serial cable **MUST** be connected to **COM 1** on the receiver.*

- Select the option for **Serial**.
- Select the correct **Comport** and **Baud Rate** (115200 is recommended) for the PC.
- Click **Connect**.

The utility will attempt to connect with the receiver. Once connected, a list of files stored within the receiver’s MMC will be displayed in the Files box (Figure 3.4). Files can be individually selected for decoding.

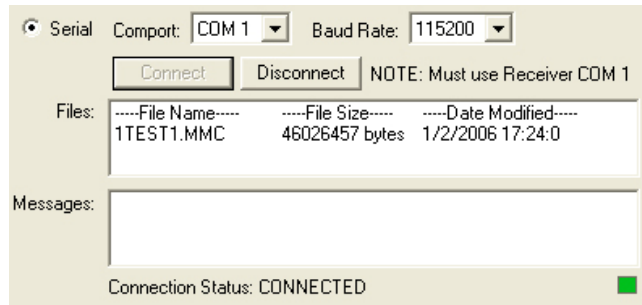


Figure 3.4: Connected Receiver Status Screen

If no connection can be made:



Figure 3.5: Not Connected Receiver Status Screen

- Click **Disconnect**.
- Make sure the serial cable is inserted into the receiver’s **COM 1** port
- Verify that the correct **Comport** and **Baud Rate** settings for the computer are selected.
- Attempt to connect again.

## Converting Files

Once a file is selected, it can be decoded into several different StarPac™ readable file formats. The default options are shown in figure 3.6. The only records needed are 0xB4 and 0xB1, for post-processing 0xB0, 0x44, and 0xB1 records are also required.

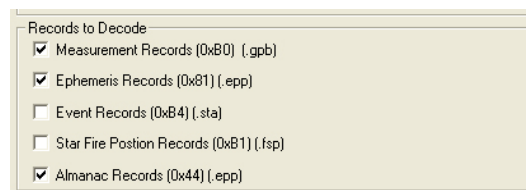


Figure 3.6: Default Decoding Options

Select the file for conversion from the file box, verify the records to decode, and then select the output options (Figure 3.7). The default file name is the same as the input name, however this can be changed by un-checking the “Use file name for prefix” box and typing in a new filename prefix.

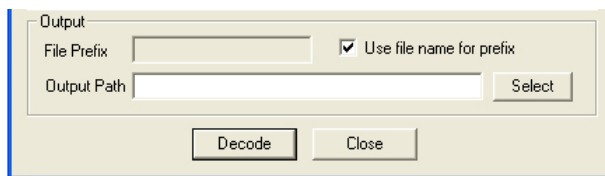


Figure 3.7: Extract NavCom Output Options

Once the file name and output path are chosen, select **Decode**. The NavCom Decoding box will be displayed and StarPac™ will begin decoding the file.



*This process can take up to several minutes depending on the speed of the system and size of the file.*

Once the decoding is complete select **Close** to close the NavCom Decoding box. If there are more files that need decoding, select them and again click decode, otherwise select **Close** on the decoding window. The decoding process created the specified files in the selected output directory.



*It is recommended to keep all the decoded files located in the same directory with the same prefix while using StarPac™. Some functions of StarPac™ will automatically detect and import needed files if they are within the same directory and of the same filename.*



*Data files downloaded from NavCom receivers are in the ITRF 2000 Datum (Referred to as ITRF00 in StarPac™ menus options). This can be changed using the Datum shift feature included in StarPac™. For more information about this feature please consult the Waypoint User Guide located under the help menu.*

The decoded files can now be integrated, analyzed, and exported with StarPac™.

## Chapter 4

## StarPac™ Utility

The default StarPac™ startup screen should look similar to Figure 4.1.

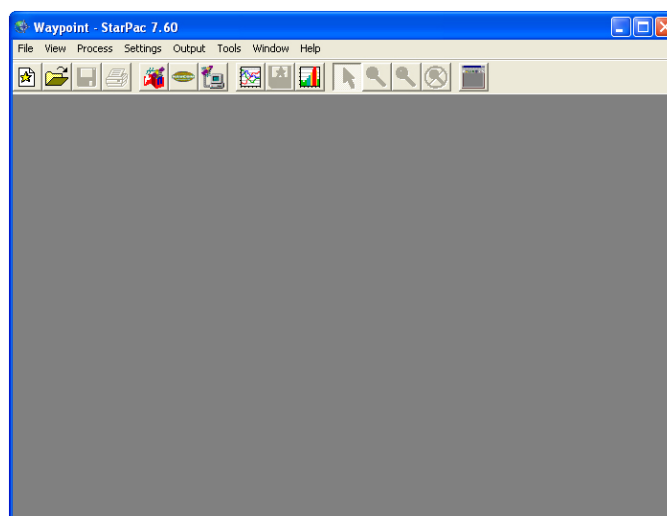


Figure 4.1: Default StarPac™ Utility Screen

The button on the far right side of the toolbar switches the view from all buttons, to a simple button layout, depending on what is preferred.

## Creating a New Project

There are two ways to create a new project, either by selecting the new project icon as seen in figure 4.2, or by selecting **File > New Project > File Name**. (Figure 4.3)

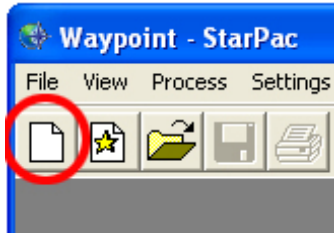


Figure 4.2: New Project Icon

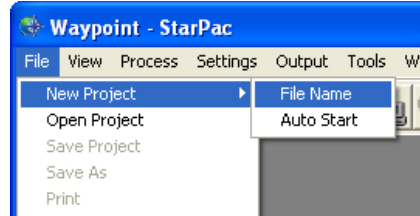


Figure 4.3: New Project Menu Option

- Select a directory for the new project file to be stored.
- Type a name for the new project file.
- Click **SAVE**.

*⚡ Although the new project has been created, the file will not be saved locally on the system until it is manually saved again. This can be accomplished by selecting **File > Save Project** or by clicking the Save icon on the title bar.*

## Adding Decoded Files

Once a new project is selected many features previously disabled are now enabled. Many of these icons and menu selections are identical to or limited features of options available in the full version of Waypoint's GrafNav. Information about these features can be found in the Waypoint User Guide located under the **Help** menu.

*📅 When VueStar™ receivers are shipped from the factory the receivers are set to log 0xB5 messages by default. Although these messages are not decoded, they are required by StarPac™ to derive the position quality and must be logged at the time of testing.*

*📅 If your project requires the use of a .GPB file (0xB0 Messages) skip to the next section; Loading a .GPB file. .GPB file **MUST** be uploaded prior to .FSB files.*

## Loading a decoded .FSB file

Once a NavCom binary data file has been decoded, the decoded file can be uploaded into StarPac™ for analysis and export.

- Select **File > Add StarFire™ Trajectory**
- Select the appropriate .FSB file that was created after the decoding the original data file.
- Select **OK**.

StarPac™ will now display a StarFire™ forward map featuring the positions for all epochs. To read an exact position, click on any displayed epoch.

## Loading a decoded .GPB File

If your project requires a .GPB file (0xB0 Messages) it **MUST** be uploaded **prior** to uploading the .FSB file.

- Select **File > Add Remote .GPB File**.
- Select the appropriate **.GPB** file that was created after decoding the original data file.
- Enter the Remote Antenna Height when prompted.
  - For More Information about the Remote Antenna Height function please consult the Waypoint User Guide.
- Select **OK**.

StarPac™ will automatically add and display any **.STA** files located in the same directory as the **.GPB** file, provided they share the same filename. The events, if present, are overlaid on the course and numbered according to occurrence. The positional accuracy of these events, and the displayed epochs, are not available until combined with a StarFire™ trajectory (.FSB).

## Adding .STA Files

Instructions for adding a separate **.STA** file can be located in the Waypoint User guide located under the help menu.

## Chapter 5

## Exporting

Now that the NavCom binary data has been decoded and converted into StarPac™ readable files, you can export this data into a format readable by many other post processing programs. The Export Wizard included with StarPac™ is identical to the Export Wizard feature included with GrafNav. The Export Profiles listed within the Export Wizard screen (Figure 5.1) **DO NOT** include the navigation solution mode, standard deviation, or combined standard deviation. If these fields are required in the output file they must be added manually. Information about manually adding fields is include in brief, further detail can be found by consulting the Waypoint User Guide.

In order add the solution mode variable to a existing profile select **Output > Export Wizard**. The window in figure 5.1 will display.

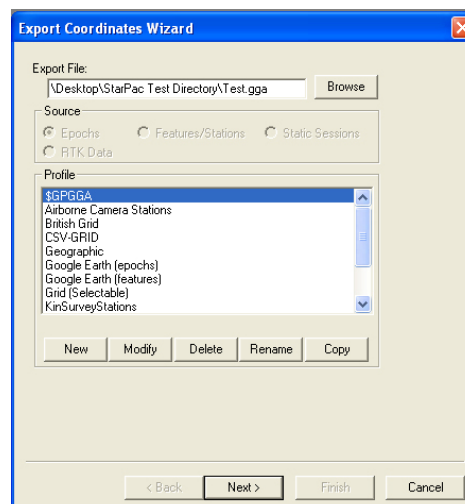


Figure 5.1: Export Wizard

From here select the Export Profile needed, create a copy, and then select modify to modify the fields outputted with that profile. (Figure 5.2)

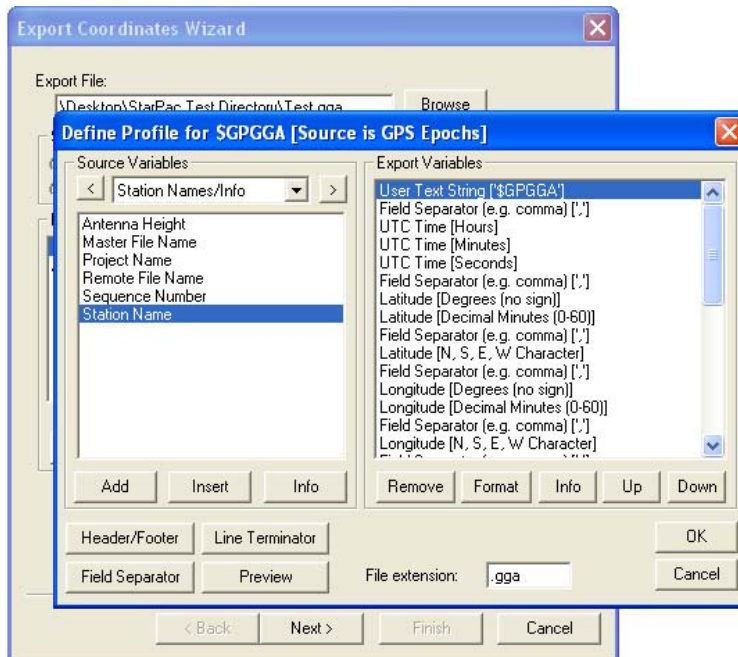


Figure 5.2: Modifying an Export Profile

In order to add the navigation solution mode, standard deviation, or combined standard deviation select **Source Variables** in the upper left corner of the menu bar, and scroll down to and select Statistics to add solution type (Nav solution mode) (Figure 5.3), or Standard Deviation to add standard deviation or combined standard deviation.

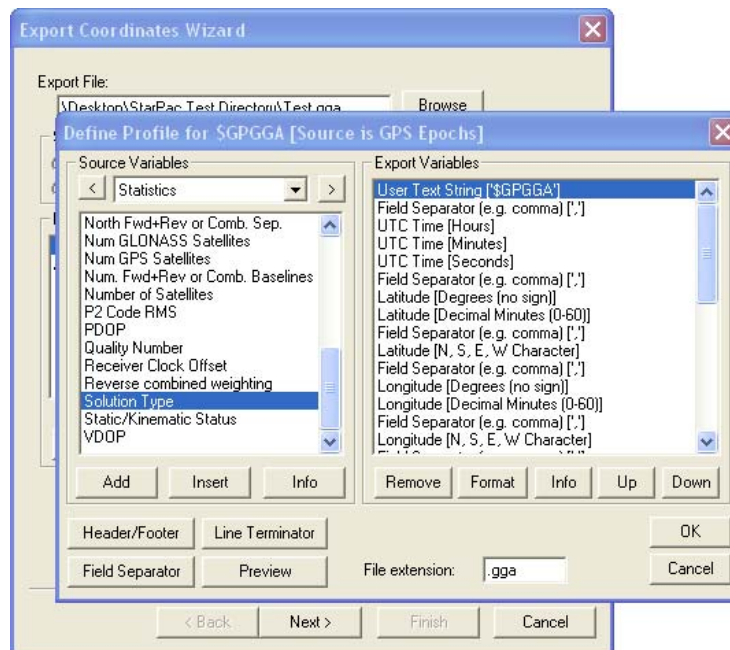


Figure 5.3: Adding Solution Type

The solution type (Navigation Solution Mode) field will be output according to Table 2.

ID (YY)	GPS CORRECTION SIGNAL
00	Non dGPS
01	dGPS, RTCM type 1 or 9, Single Freq
02	WAAS/EGNOS, Single Freq., (See GSA for SBAS Id in use)
03	WAAS/EGNOS Dual Freq., (See GSA for SBAS ID in use)
04	StarFire WCT, Single freq.
05	StarFire WCT, Dual freq.
06	StarFire RTG, single freq. (no 'Tide' Adjustment)
07	-reserved-
08	-reserved-
09	-reserved-
10	dGPS, RTCM type 1 or 9, Dual Freq.
11	StarFire RTG dual freq. (no 'Tide' Adjustment)
12	Code base Nav, Single Frequency, NCT Proprietary Format
13	Code base Nav, Single Frequency, RTCM 18/19
14	Code base Nav, Single Frequency, RTCM 20/21
15	Code base Nav, Single Frequency, CMR
16	Code base Nav, Dual Frequency, NCT Proprietary Format
17	Code base Nav, Dual Frequency, RTCM 18/19
18	Code base Nav, Dual Frequency, RTCM 20/21
19	Code base Nav, Dual Frequency, CMR
20	RTK Mode, NCT Proprietary Format (5e/5c or 5b/5c)
21	RTK Mode, RTCM 18/19
22	RTK Mode, RTCM 20/21
23	RTK Mode, CMR
24	StarFire RTG, single freq., Adjusted for 'Tide'
25	StarFire RTG, dual freq., Adjusted for 'Tide'
26	RTK Extend

Table 2: Navigation Mode; ID YY

For further information about modifying profiles, adding variables and exporting data please consult the Waypoint User Guide. Located under the **Help** menu.