

Reality XP 430/530 WAAS X-Plane

User's Manual



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About this manual

This manual is intended for flight simulation purposes only, and shall not be used for any real world aviation application or reference.

This manual is intentionally written using “gray scale” colored text in many areas, and much of the print is intentionally this medium gray color. This has been done to conserve ink while printing. In some cases, “black” type has been used for emphasis. Photographs used in this manual have also been reduced to black and white, and also in contrast in order to conserve ink. Please be sure to double-check your printer’s settings prior to printing in order to achieve the best results. We have tested, and experienced no issues printing this manual on laser printers. If you are experiencing a problem using a laser printer, you should check the printer’s quality settings.

By reading this manual, you should become well acquainted with the product, and should be able to obtain the information necessary to “fly” the product within X-Plane Simulator.

Please take the time to read this manual completely; so that you can become properly acquainted with the product and its operation.

We thank you for having chosen a Reality XP Product and wish you a pleasant and a safe virtual flight with us.

Important information

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www.reality-xp.com

Standard Disclaimer

This software is designed **for entertainment only**. Although we have designed the product to resemble and function like the original, it is not designed as a training device. Not all systems have been simulated, and some of those that have been simulated may not be entirely functional.

NOT FOR USE IN REAL FLIGHT OR AIRCRAFT OPERATION.

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GNS 430W/530W Overview

The GNS 430W/530W is a comprehensive full-featured radio and navigation stack. The Reality XP GNS simulation is a faithful reproduction that pilots and simmers can use it as a training tool to familiarize themselves with the workings of the actual equipment. Each button and knob is fully functional and performs identically to its real-world counterpart.



GNS 430 WAAS in the XScenery MU-2 Marquise

The GNS 430W/530W comes with built-in WAAS navigation capabilities, and is capable to fly LPV “glideslope” approaches without reference to ground-based nav aids of any kind. Featuring an advanced 15-channel receiver capable of five position updates per second, GNS WAAS meets the FAA's stringent TSO C146a standards for WAAS “sole means” navigation — providing vertical and lateral approach guidance into thousands of U.S. airports previously inaccessible in IFR conditions

Navigation Database

The GNS 430W/530W seamlessly integrates built-in terrain and navigation databases, providing a clear, concise picture of where you are and where you're heading, using the Garmin Ltd. Trainer huge Jeppesen® database containing location reference for all airports, VORs, NDBs, Intersections, Flight Service Stations, published approaches, SIDs/STARs, Special Use Airspace and geopolitical boundaries. A detailed basemap clearly shows airports, cities, highways, railroads, rivers, lakes, coastlines and more. Using information from the built-in terrain and U.S. obstacles databases, the 430W/530W displays color coding to graphically alert you when proximity conflicts loom ahead

Jeppesen® is not offering Database updates yet for the GNS 430W/530W simulation.

X-Plane & Operating systems Compatibility

The GNS 430W/530W is compatible with X-Plane 9.xx. In addition, The GNS WAAS 430XP/530XP is compatible with Windows XP, Vista 32 and Vista 64.

Product Documentation

After installation, a new program group is accessible from your Windows Start Menu \ Reality XP. This program group contains the necessary utilities and documentation. Make sure you review all available documentation.

The systems features are simulated in form, fit and function. The GNS 430W/530W is developed as accurately as is possible based on its real-world counterpart. Original Garmin Documentation and Pilot's Guides install in their own Garmin program group.

Please take the time to read all manuals completely so that you can become properly acquainted with the product and its operation.

GnsCore XP

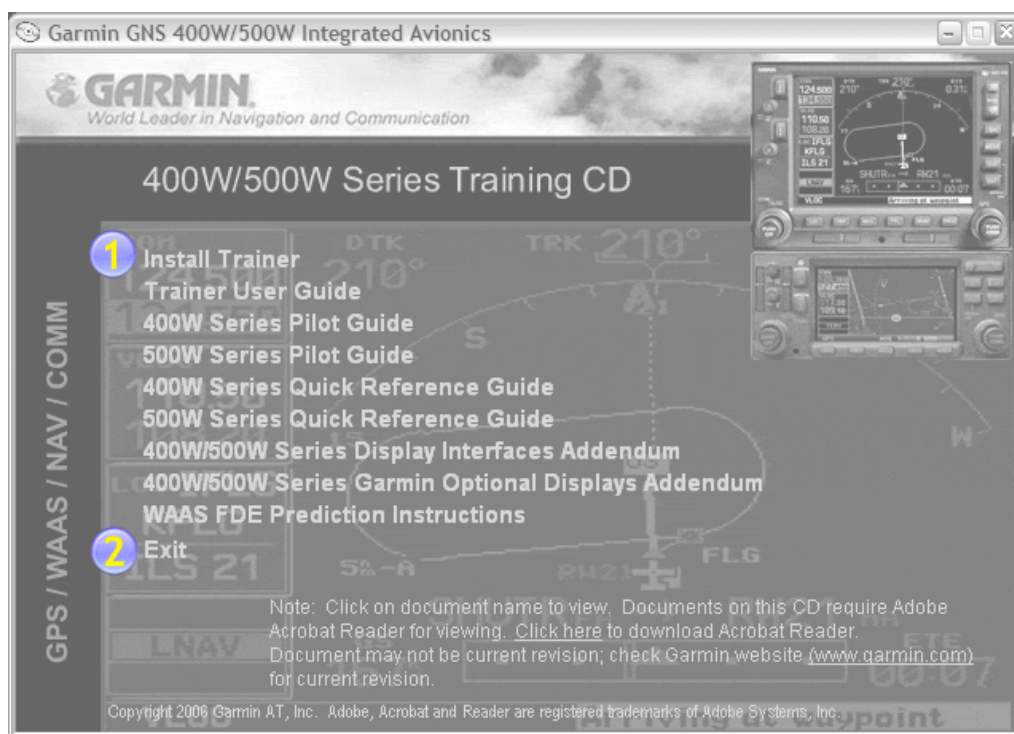
The GNS 430W/530W includes GnsCore XP, a unique Reality XP technology bridging the Garmin Trainer program and the simulation. GnsCore XP automatically detects, starts, controls and stops the Trainer in the background when the GNS simulation is running. This process is fully automatic and does not alter the genuine Garmin Trainer files on the hard drive. GnsCore XP manages its settings in memory dynamically.

Additional information about GnsCore XP is located at the end of this manual.

Garmin GNS WAAS Trainer

The GNS 430W/530W uses the Garmin GNS WAAS Trainer program to run. To complete your product installation, you also need to install the Trainer program, which is available with the product installer.

The first time you install the product, you have to select the “Install/Repair Garmin GNS WAAS Trainer” installer option. Doing this will launch the Garmin WAAS Trainer separate installer automatically. When prompted with the Garmin installer, first select “Install Trainer” option. When done, select “Exit” option to finalize the product installation. We strongly recommend you install the Garmin Trainer Program in its default location.



If you install this package for the first time, or need to repair the Garmin WAAS Trainer installation, the installer will save a copy of the WAAS Trainer installer in the following folder:

WinXP:

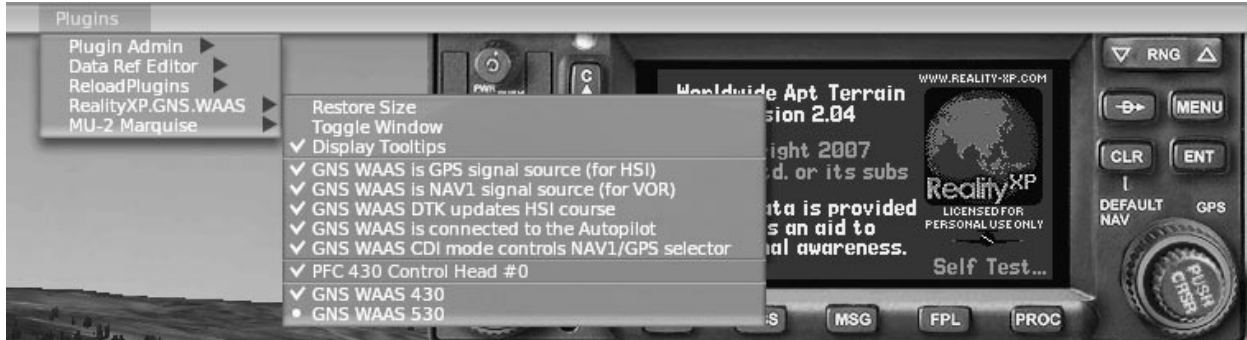
[X]\Documents and Settings\All Users\Application Data\Reality XP\Common\GnsTrainer\WAAS\

Vista:

[X]\Program Data\Reality XP\Common\GnsTrainer\WAAS\

Getting Started

The GNS 430W/530W always loads with X-Plane and is readily available to equip any aircraft. The plug-in features are accessible through the “RealityXP.GNS.WAAS” menu in X-Plane. Some options below require a minimum of the latest X-Plane version (9.4 at the time of this writing).



Restore Size

Selecting this menu item when the simulation is running, positions the GNS WAAS simulation window to the top-right corner of the X-Plane window, and resizes the window: the simulation screen matches exactly the native GNS WAAS screen size and resolution for best clarity.

Toggle Window

Select this menu item to hide or show the GNS WAAS simulation window.

Display Tooltips

Selecting this menu item activates the tooltip system: tooltips display when the mouse hovers above a key or knob.

GNS WAAS 430/530

These options activate if you have purchased the corresponding product. Select the unchecked menu item to load and start the simulation (check mark is set), or select the checked menu item to stop and unload the simulation. You can only run one type of GNS simulation at a time.

is GPS signal source (for HSI)

An HSI set to GPS source will display GNS WAAS LCDI/VCDI when selecting this option.

is NAV1 signal source (for VOR)

A VOR will display GNS WAAS LCDI/VCDI when selecting this option and the GNS WAAS CDI mode is in *GPS*.

DTK Updates HSI Course

When GNS WAAS has an active TO waypoint, is in GPS mode and X-Plane NAV1/NAV2/GPS selector is in GPS mode, the HSI course automatically changes when the GNS WAAS DTK changes.

Is connected to Autopilot

GNS WAAS commands the Autopilot in NAV/LOC mode.

CDI controls NAV1/GPS

GNS WAAS CDI mode controls X-Plane NAV1/NAV2/GPS selector automatically, selecting either NAV1 or GPS source.

Hardware Controllers

The GNS 430W/530W readily includes support for the following hardware devices:

- PFC 430 Control Head Standalone
- PFC 430 Control Head included in PFC Avionics Stack

When the plug-in loads, it automatically detects the connected hardware and lists them in the menu. Selecting the corresponding hardware in the menu (check mark set) connects the GNS WAAS simulation to the hardware (this feature requires separate activation or a hardware enabled version. See www.reality-xp.com for available options).

General features

Mouse Controls

Mouse controls utilize a relatively unique implementation of click spots. They work as follows:

1. As your mouse cursor passes over a click spot it will cause it to turn from an arrow cursor into a “hand” cursor.
2. Whenever a single click spot is used, and depending upon its function a left click will accomplish the task.
3. Certain click spots work with left clicks and the mouse wheel, if your mouse is so equipped. This type of click spot is used on gauges that require adjustment, such as the knobs, etc. In this case, the left click turns the item to the counter-clockwise direction when the mouse is in an area to the left of the knob and the left click turns the item to the clockwise direction when the mouse is in an area to the right of the knob. Forward/Backward scrolling with the mouse wheel turns the item in either direction regardless if the mouse is to the left or to the right of the knob.

Simulation Window Size

The simulation window freely resizes with the mouse when grabbing any of its edges or corners. In addition, pressing and holding the SHIFT key while resizing constrains the window size to the correct gauge proportions.

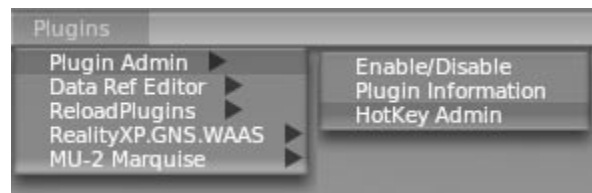
Persistent Settings

Every time the GNS simulation opens when flying an aircraft, the last known window size, window position and simulation type (430W or 530W) are saved in a file in the aircraft folder. The next time the aircraft is loaded, the same simulation type (430W or 530W) opens automatically and displays at the same size and position. Separate window positions and sizes are saved for each simulation type. The settings file name saved in the aircraft folder is:

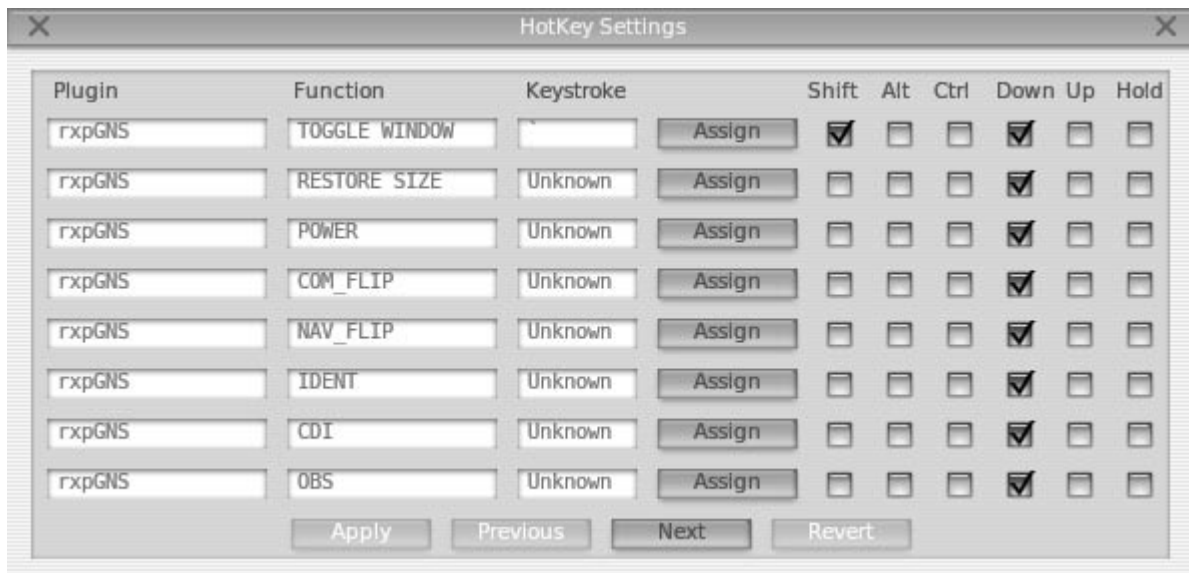
RealityXP.GNS.WAAS.INI

Keyboard shortcuts

To change hotkeys, use the Plugin Admin Menu:



Look for the rxpGNS entries in this screen. Use the Assign button to assign some other key, use the check boxes on the right to define the modifiers. Hint: Down or Up work for single key strokes, Hold enables continuous change while holding the specified key down and is best recommended for knobs.



Please note the "TOGGLE WINDOW" function automatically is automatically set with the SHIFT+BACKQUOTE shortcut the first time you run the simulation and can be changed later.

Once you have assigned the keys, hit the Apply button and close. Please note that the new assignment only gets saved once you exit X-Plane. The plug-in saves the hotkey configuration when you quit X-Plane in a file in X-Plane preferences folder.

The hotkey configuration file name in the X-Plane preference folder is:

RealityXP.GNS.WAAS.INI

Integration with X-Plane

Plug-in

The simulation comes in the form of a plug-in installed in the Resources\Plugin folder with the name rxpGNS.xpl. There is only one plug-in for both the 430W and the 530W simulation. It requires purchasing and installing both products to unlock both GNS models, i.e. when installing only one GNS type the plug-in will activate only this installed type.

The plug-in integration is consistent with X-Plane panel system, and provides adjustable integral and screen lighting with the standard X-Plane integral lighting dimmer and the bezel colors adjust with the X-Plane panel lighting. In addition, the GNS window displays transparently with the transparent panel option.

X-Plane Autopilot

Starting with X-Plane 9.3, GNS WAAS connects to the XPlane HSI and VOR gauges LCD/VCDI in order to display path deviation (horizontal and vertical).

Starting with X-Plane 9.41, GNS WAAS connects to the X-Plane autopilot. Lateral mode arms with HNAV. When HDG mode is engaged and HNAV mode is armed, the autopilot engages HNAV automatically when the CDI comes live. In addition, LPV approaches can be flown using an experimental capability and a workaround with GS/HNAV modes.

X-Plane limitations

The interfaces available to develop plugins is not offering all the level of data necessary to realize a complete integration of the GNS WAAS simulation with all aircraft, as of this writing (X-Plane 9.41). We have not received any positive commitment future XPlane versions will correct the limitations and incomplete interfaces we have identified and communicated to Laminar Research. However, some of the integration features are using workarounds to lessen these limitations.

Due to incomplete access to the aircraft fuel data, the simulation of the Shadin Fuel interface is disabled. However, fuel prediction in the AUX pages works with manual entries.

The ARNAV Airdata simulated interface is active but can show few discrepancies in the AUX/Wind page. This is a discrepancy between the simulated “air mass” in XPlane and the atmospheric model in the GNS. This also affects the internal GNS WAAS wind direction and speed computation. As a result, the wind arrow and speed displayed on the map page can be slightly off the X-Plane wind values.



As the X-Plane SDK evolves with future version, we will evaluate the new capabilities and we will try to further integrate the GNS WAAS simulation with the host simulation.

X-Plane Commands

The GNS WAAS simulation is controllable via X-Plane commands. This permits configuring hardware devices and creating custom panel gauges in using X-Plane's gen_trigger gauge element to activate the GNS WAAS simulation. The available commands are listed below, along with their supported action:

RXP/GNS.WAAS/CMD/TOGGLE_WINDOW	Press
RXP/GNS.WAAS/CMD/POWER	Press
RXP/GNS.WAAS/CMD/COM_FLIP	Press Release
RXP/GNS.WAAS/CMD/NAV_FLIP	Press
RXP/GNS.WAAS/CMD/IDENT	Press
RXP/GNS.WAAS/CMD/CDI	Press
RXP/GNS.WAAS/CMD/OBS	Press
RXP/GNS.WAAS/CMD/MSG	Press
RXP/GNS.WAAS/CMD/FPL	Press
RXP/GNS.WAAS/CMD/NAV	Press
RXP/GNS.WAAS/CMD/PROC	Press
RXP/GNS.WAAS/CMD/RNG_INC	Press
RXP/GNS.WAAS/CMD/RNG_DEC	Press
RXP/GNS.WAAS/CMD/DTO	Press
RXP/GNS.WAAS/CMD/MNU	Press
RXP/GNS.WAAS/CMD/CLR	Press Release
RXP/GNS.WAAS/CMD/ENT	Press
RXP/GNS.WAAS/CMD/LEFT_PUSH	Press
RXP/GNS.WAAS/CMD/RITE_PUSH	Press
RXP/GNS.WAAS/CMD/LEFT_OUTER_CCW	Press
RXP/GNS.WAAS/CMD/LEFT_OUTER_CW	Press
RXP/GNS.WAAS/CMD/LEFT_INNER_CCW	Press
RXP/GNS.WAAS/CMD/LEFT_INNER_CW	Press
RXP/GNS.WAAS/CMD/RITE_OUTER_CCW	Press
RXP/GNS.WAAS/CMD/RITE_OUTER_CW	Press
RXP/GNS.WAAS/CMD/RITE_INNER_CCW	Press
RXP/GNS.WAAS/CMD/RITE_INNER_CW	Press

Mac Compatibility

The GNS WAAS simulation for X-Plane uses a helper application from Garmin designed and compatible with the Windows Operating System. However, our labs are trying to leverage virtualization technologies like Parallels Desktop or VMware Fusion to bridge the Garmin GNS simulation components with X-Plane on Mac for a future version.

Advanced Configuration and hardware controls

Additional settings can be manually configured in the `RealityXP.GNS.WAAS.INI` file saved in the aircraft folder. When adding a section labeled `[PANEL2D]` and/or `[PANEL3D]` the plug-in draws the GNS Simulation in the corresponding 2D/3D panels, at the set position and size (in addition to the popup window). The `ScreenOnly=` setting tells the plug-in to render the entire gauge (bezel and screen) when set to 0 or to render the screen only when set to 1.

```
[PANEL2D]
ScreenOnly=0
Position.left=
Position.top=
Position.width=
Position.height=

[PANEL3D]
ScreenOnly=1
Position.left=118.0
Position.top=458.1
Position.width=176
Position.height=90
```

The GNS WAAS plugin is compatible with selected hardware devices. The following settings configure the hardware type and index (when using two hardware devices, the index differentiate the two). At this time GNS WAAS supports the following hardware type:

- **PFC_430** for the Precision Flight Controls 430.
- **PFC_STACK** for the Precision Flight Controls Avionics Stack embedding a 430.

```
[SIMULATION]
HardwareDevice=PFC_430
HardwareIdx=0
```

Advanced Cockpit Integration

The GNS WAAS plugin shares custom datarefs with other plugins for advanced integration in a way designed to ease 2D and 3D cockpit designers. The datarefs names are

```
RXP/GNS/WAAS/430/1/LEFT
RXP/GNS/WAAS/430/1/RITE
RXP/GNS/WAAS/430/1/POWER
RXP/GNS/WAAS/430/1/STATUS
```

LEFT and .RITE are angles (animation value in range [0..100] for [0..360] degrees), .POWER is either 0: power button off or 1: power button on and STATUS is either 0: GNS is off or 1: GNS is on. The first three datarefs permit animation matching between 3D knobs and the simulation as it is displayed in its own popup window for example, while the last dataref permit displaying (or not) the integral lighting based on GPS power status and not on XPlane power status.

Similarly, equivalent datarefs beginning with `RXP/GNS/WAAS/530/1/` are shared when running the GNS WAAS 530 simulation instead of the GNS WAAS 430.

Additional Configuration for Professional Version

FuelType selects the fuel density used in the GNS WAAS fuel computations. Choose one of: AVGAS, JETA, JETB (defaults to AVGAS).

```
[SIMULATION]
FuelType=AVGAS
```

The GNS WAAS Simulation window can display the GNS WAAS screen only, with an optional colored frame surrounding. The settings available are:

```
[WINDOW]
ScreenOnly=1
ScreenOnly.Frame.rgb=10,10,10,255
ScreenOnly.Frame.size=10
```

Frame color is standard red,green,blue,alpha (with 255 fully opaque). Size is in pixels.

Release Notes & Troubleshooting

Latest release notes, configuration tips and FAQ are available in the Reality XP knowledge base at:

<http://www.reality-xp.com/support/>

Windows Vista/Win7: Data Execution Prevention (DEP)

On some system, it is necessary to include the files `RXPG1AE.EXE` (for the GNS WAAS 430) and `RXPG212.exe` (for the GNS WAAS 530) in Windows Data Execution Prevention (DEP) list. You might want to also add `G530SIM.exe` in the list. NB: the `RXPGxxx.exe` files are located in:

```
WinXP: C:\Documents and Settings\user name\Local Settings\Application
Data\Reality XP\rxpGnsSim\
Vista/W7: C:\Users\user name\AppData\Local\....
```

To add a program in the exception list:

1. Open the Control Panel (Classic View), click on the System icon and go to step 3.
2. Open the Start Menu, right click on Computer and click Properties.
3. Click on Advanced system settings. (in upper left green area)
4. Click on the Continue button in the UAC prompt.
5. Click on the Settings button under Performance section.
6. Click on the Data Execution Prevention tab, and select one of the two options below:
7. Turn DEP On for Essential Windows Programs and Services Only. This turns on DEP for only the 32 bit system programs and services. This is the default setting. Select this option and go to step 9.
8. Turn DEP On for All Programs and Services Except for the Ones you Select. This turns on DEP for every 32 bit program except for the ones that you add to the list. The listed program will have DEP turned off for it. Select this option, then click Add to add the programs (32 bit)

that you do not want to use the DEP feature. This opens a file browser. Navigate to the program's .exe file that you want to add to the DEP exclusion list and select it, then click on Open.

9. Click OK to apply, and restart the computer to apply changes.

XPlane Process Priority

Changing XPlane process priority to anything other than normal can lead to malfunctioning and/or slow responding GNS WAAS Simulation. We recommend you leave the XPlane process priority to normal. However, in order to accommodate different user-selected XPlane process priorities, the GNS WAAS automatically sets itself one-notch above the XPlane process priority:

- When starting XPlane in normal priority, the GNS WAAS sets itself in above-normal priority like expected.
- When starting XPlane in above-normal priority, the GNS WAAS sets itself in high.
- When starting XPlane in high priority, the GNS WAAS won't go further than high (otherwise the next one-notch above process priority available is real-time and this could have adverse effects to the system and the applications).

This automatic GNS WAAS process priority adjustment happens when XPlane is already running and an aircraft with the GNS WAAS loads afterward. However, once XPlane is ready to fly with a GNS WAAS equipped aircraft, subsequently changing the XPlane priority will not adjust the GNS WAAS process priority anymore. In order to benefit from the GNS WAAS automatic process priority adjustment, the XPlane process priority must be changed prior loading an aircraft with the GNS WAAS.

Antivirus

It has been reported Kapersky and AVG might be causing issues with the product with some customers. If the solution is not working properly, we suggest you configure the antivirus to always "trust" rpxGNS.dll, rpxGNS.gau, rpxGnsSim.dll and RealityXP.dll, or, to disable your anti-virus if an "allow list" feature is not available. Although we can't vouch for any particular anti-virus, we have good satisfaction with NOD32, both in regard to FS stability in particular and to Windows in general.

If you have an AMD CPU: product optimizations

Make sure to let us know if you run into problems. There are optimized code paths for the graphics, optimized for SSE, SSE2, SSE3, SSSE3 and SSE4, as well as for Core Duo/Core Quad. The optimized code might be wrongly directed on an AMD CPU.

If you have an AMD CPU: Windows 7

When using an AMD CPU with Windows 7, you might need to add "explorer.exe" to the DEP exclusion list. (see "the Windows Vista/Win7: Data Execution Prevention (DEP)" note above in order to configure DEP).

Customers of the Flight Line 430/530XP for FSX/9

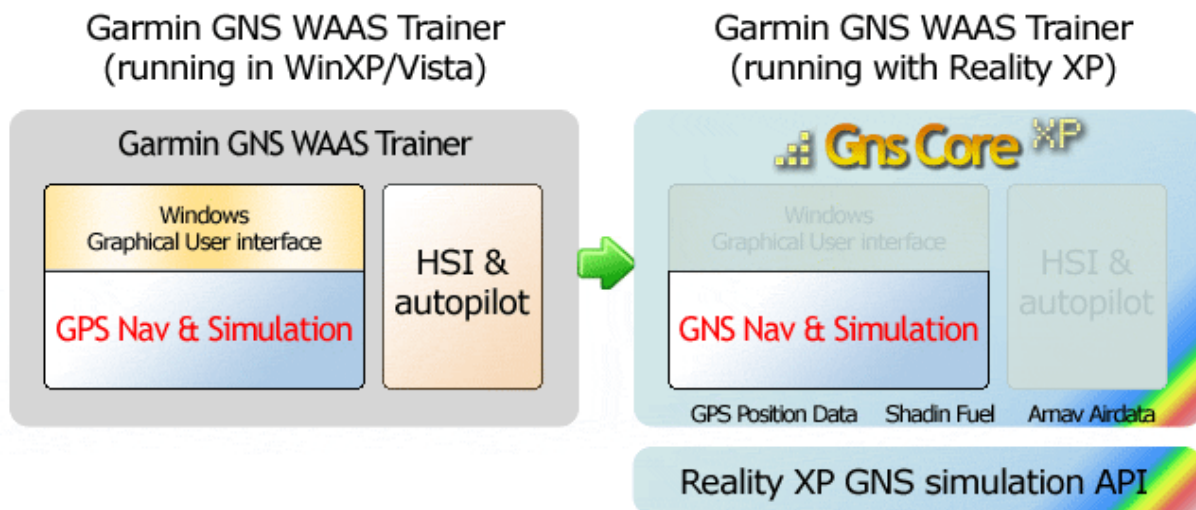
The GNS 430/530 WAAS simulation for XPlane 9 can be installed on the same computer. There is no known conflicts or issues.

Garmin Simulation: GnsCore XP

With the GNS 430W/530W you'll be flying with a simulated avionics package capable of providing the same features and benefits as the real avionics. The simulation solution includes:

- The simulation plug-in offering the user interface in X-Plane and includes the GNS gauge with the correct look and feel.
- The GNS simulation running in the background, wrapped into a unique Reality XP interface to the Garmin GNS WAAS Trainer program: **GnsCore XP**

GnsCore XP is our unique technology that integrates with the Garmin GNS WAAS Trainer program. This allows us to offer extended simulation and control capabilities to the GPS within Flight Simulation programs. GnsCore XP unpacks the 32 bits Trainer program from its Windows XP/Vista components while they are running in memory and wraps the GNS Simulation components into a simulation API:



GnsCore XP offers key enhancements to the solution:

- Minimizes overhead by just running what is required.
- Duo/Quad/Multi core CPU optimizations.
- Precise and direct control of any GNS simulation core parameters.
- Several key ARINC/Serial inputs like Shadin Fuel, Arnav Airdata, Ryan TCAD.
- Several key ARINC/Serial outputs like Aviation Data.
- Avionics Electric Bus interface.
- Capability to run more than one Trainer at the same time on the same computer, and many more features described in this manual!

NB: some of these features are implemented only when the host simulation platform permits.

Product Support

You should read this manual, and the others included with this product from cover to cover before asking for support or help with this product. We have found that over 95% of all product support questions can be answered by reading the manual.

You can visit the Reality XP General Forum for general customer service issues.at:

<http://www.reality-xp.com/community/users.htm>

While anyone may read this support forum, you will need to register in order to post a question or reply with an answer. Support at this forum may be provided by any one of the following individuals:

1. Members of the Development / Publishing Team.
2. Members of the product's beta testing team.
3. Knowledgeable users of the product who know the correct answer.

If you still require help: Product support is available through our online help system. Please visit <http://www.reality-xp.com> for additional support information.

Thank you.