



# RXP GNS 530W/430W V2

## User's Manual For X-Plane

### Fly Waas Approaches!

The WAAS-certified GNS 530W and its slightly smaller sibling, GNS 430W, lead the industry with multitasking, integrated avionics and cutting-edge WAAS navigation. The GNS 530W comes with optional Class B TAWS alerting to warn you of potential terrain and obstacle conflicts along your flight path. Both come with optional Ryan 9900B TCAD, Shadin Fuel and Shadin Air input, and cross fill capability.

The Reality XP GNS 530W/430W V2 is an entirely new GNS WAAS simulation product built on our unique expertise in designing the most authentic Garmin devices simulation since 2002.

### About This Manual

This manual guides you through the product features and is intended for flight simulation purposes only. It shall not be used for any real world aviation application or reference. By reading this manual, you should become well acquainted with the product, and should be able to obtain the information necessary to use the product in your simulator.

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

**Product 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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## Introduction

The Reality XP GNS 530W and GNS 430W V2 gauges is a faithful reproduction that pilots and flight simulator users 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.

Garmin avionics have become the clear #1 choice in the owner-flown aircraft market. Nearly three-fourths of all U.S. single- and twin-engine piston and turbine aircraft retrofitted since 2000 are now flying with Garmin GPS-enabled equipment. The provision of the integrated communication and navigation radios in the unit gives the extra capabilities of auto tuning and pre-fetching your navigation and approaches frequencies. Flying has never been easier!

The Reality XP GNS 530W and GNS 430W V2 are navigator's heaven with an extraordinary number of user customizable navigation information fields. In short, there is simply no better simulation of the GNS 530W and GNS 430W for any flight simulator, period.



## System Requirements

The Reality XP GNS 530W/430W V2 requires Laminar Research X-Plane 11, 10 or 9 for Windows<sup>1</sup>.

During installation you will be prompted to download and install the Garmin GNS Trainer Lite<sup>2</sup>. The first time you install this package, or should you need to repair the Garmin Trainer installation, the installer will save a copy of the trainer installer in: "C:\ProgramData\Reality XP\Common\GnsTrainer"

This Garmin trainer is a more recent version never offered before in flight simulation, exclusively showcased in our solution. It has main software version 3.3 released in 2010 and includes bug fixes, faster updates, takes less resources and adds some new capabilities to the integrated navigator.

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<sup>1</sup> X-Plane minimum versions required: 11.x (64bits), 10.5(64/32bits), 9.42(32bits) ; Windows versions required: WinXP to Win10

<sup>2</sup> Compatible trainer versions: 3.3

## Getting Started

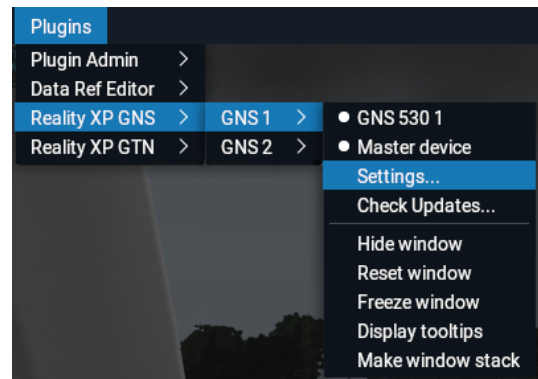
### Garmin Reference Guides

In addition to this user's manual which guide you through the functions within the simulator, we recommend referring to the original Garmin GNS series pilots and cockpit reference guide that is installed in its 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.

### Plugins Menu

The GNS 530W/430W V2 plug-in loads automatically and is operated using the X-Plane Plugins menu.

Select the menu **Plugins | Reality XP GNS** to add or remove a GNS unit to your aircraft. Once a device is active, additional options appear in the menu:



Master Device	the Master Device has autopilot and navigation authority in dual-GNS panel installations.
Settings...	open the configuration panel.
Check Updates...	check wether there is a new version released.
Show Window	show or hide the gauge window.
Reset Window	reset default gauge size.
Freeze Window	locks window dimensions.
Display tooltips	show or hide mouse tooltips.
Make window stack	make this window the top of the stack, the other adjusts below.

### Configuration Panel

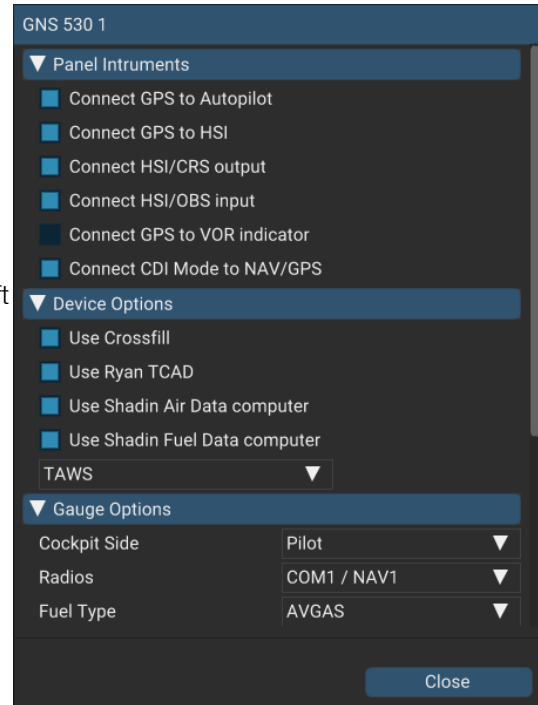
The GNS can be tailored to suit your needs by configuring the way each device looks and behaves. Most of each device configuration options are available from the configuration panel.

Select the menu **Plugins | Reality XP GNS | GNS # | Settings...** to open the configuration panel.

Options are set up for an individual aircraft and then saved to the "RealityXP.GNS.ini" file in the aircraft folder. When loading the aircraft the plug-in restores the last known settings, including window size and position.

Whenever the configuration changes, the last row changes to display 'Cancel' and 'Accept' buttons.

When changed settings require rebooting the device, a warning 'reboot' tag displays next to each one and the confirmation button changes to 'Accept and Reboot'.



### Using The Mouse

This gauge implements a relatively unique implementation of click spots. They work as follows:

- As the mouse cursor passes over a click spot it changes from an arrow cursor to a "hand" cursor.
- Whenever a single click spot is used, a left click will accomplish the task.
- Left clicks turn knobs to the counter-clockwise direction when the mouse is in an area to the left of the knob and to the clockwise direction when the mouse is in an area to the right of the knob.
- Mouse wheel turns knobs in either direction regardless if the mouse is to the left or to the right.

### Resizing The Gauge Window

The simulation window resizes and maintains its aspect ratio. While the mouse cursor is grabbing any of its edges or corners, **press and hold the SHIFT key** to relax the aspect ratio constraint while resizing.

## Plugin Details

The simulation comes in the form of a plug-in installed in the "XPlane\Resources\Plugin\rxpGNS" folder<sup>3</sup>. There is only one plug-in for both the GNS 530W and the GNS 430W simulation<sup>4</sup>.

The GNS is capable of precise course deviation and roll steering outputs that can be coupled to the simulator autopilot so that IFR flight procedures may be flown automatically. In addition to GPS integration to the panel system, the GNS offers some additional features described below.

### Radios

The GNS 530W and GNS 430W V2 can control the simulator COM and NAV audio panel volumes using the **Power** and the **Volume** knobs respectively (XP10+ only).

To accommodate a wider variety of aircraft panels, the GNS 530W license unlocks the **GPS 500W**. Similar in form and function to the 530W, the radio-less sibling fits panels already equipped with radios.



### Integral Lighting

The plug-in integrates with the X-Plane panel system and provides adjustable integral lighting through the default X-Plane integral lighting rheostats.

Using the configuration panel, select whether you prefer constant or adjustable brightness. The later offers a choice among the first 4 available X-Plane standard rheostats.

### Traffic Collision Alerting Device

The GNS offers a faithful simulation of the Ryan 9900B TCAD (Traffic Collision Alerting Device). Internally powered by a complete TCAS II Mark 7 simulation passing the 250 TSIM tests, it comes integrated to the RXP GNS 530W and the RXP GNS 430W V2. Take full control of the TCAD detection shields, view nearby traffic and take actions upon visual and aural TA advisories directly on the GNS device. The TCAD simulation takes its data source from the standard X-Plane multiplayer datarefs.

### X-Plane GPS commands

The GNS can be configured to intercept all of the default X-Plane GPS commands. When the option is enabled in the configuration panel, the X-Plane GPS bezel buttons and knobs control the GNS.

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<sup>3</sup> X-Plane 9: "Resources\Plugin\rxpGNS2.xpl"

<sup>4</sup> Although a single plug-in file installs, it requires purchasing and installing both products to unlock both GNS models.

## Failures Annunciation

When enabled in the configuration panel, the GNS plugin uses the following datarefs<sup>5</sup> as failures sources:

sim/operation/failures/rel_gps sim/operation/failures/rel_g430_gps1	Satellite reception failure, displays "No GPS Position"
sim/operation/failures/rel_gp	Differential GPS failure, reduces location accuracy. Satellite reception mode switches to 3D instead of 3D-Diff.



## Cross Fill

When enabled in both GNS, this option allows you to transfer a direct- to destination, the active flight plan including VNAV parameters, any stored flight plan or user waypoints to a second 400W or 500W device.

If both units are set to automatic (in the Garmin GNS device settings), a change in the active flight plan, or VNAV parameters, on one unit can also be seen in the other. Initiating a direct-to course to a waypoint on one unit also initiates a direct-to course to the same waypoint on the other unit.

## Pilotedge Integration

Real flying takes place in a dynamic environment populated by other human beings. In a real airplane there's no Pause key, and the pilots and air traffic controllers you interact with on the radio are real people. Enter PilotEdge. Connecting your flight simulation software to PilotEdge<sup>6</sup> instantly creates the same mental environment you find yourself in when you fly a real airplane.

When using the Pilotedge plugin online, the GNS COM box automatically annunciates the **RX flag** when receiving audio and the **TX flag** when transmitting audio.

## Keyboard Shortcuts

To change hotkeys, use the X-Plane Plugin Admin Menu. These are saved in a "RealityXP.GNS.INI" file located in the X-Plane preference folders.

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<sup>5</sup> Pilot side datarefs appear in the table, equivalent copilot datarefs are also supported with the GNS configured to copilot side.

<sup>6</sup> <https://www.pilotedge.net>

## Flight Plans And User Waypoints

Flight plans can be created on a computer using compatible flight planning software and saved to a virtual datacard folder to be imported into the GNS. The imported flight plans can then be stored to the GNS flight plan catalog. This chapter describes how to enable and use this feature.

### Preparing the virtual datacard

The first step is to create a virtual datacard folder where to store the flight plans and the user waypoints. This folder must be named **FPL** and be located in the GNS Trainer Data folder, typically<sup>7</sup>:

```
"C:\ProgramData\Garmin\GNS Trainer Data\GNS\FPL"
```

The second step is to create one or more flight plan files with the ".fpl" file extension. The product comes with a starter pack installed into the following folder:

```
"C:\ProgramData\Reality XP\Common\GnsTrainer\flightplans.zip"
```

### Importing flight plans

The last step is to import the flight plans into the GNS device. To proceed with the starter pack, unzip the "flightplans.zip" archive file to extract the "LFATLFRG.fpl" flight plan sample file, then copy the file to the "FPL" folder.

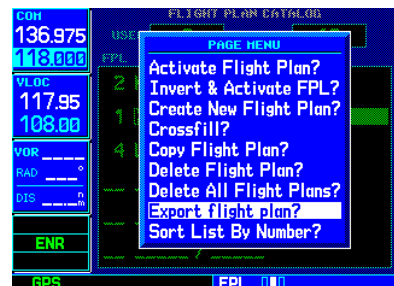
On the GNS device, while viewing the Flight Plan pages, turn the outer GPS knob clockwise to reach the 3rd FPL page and select flight plan file, and the FPL number this flight plan will be assigned to. When done, select **Import?**



### Exporting flight plans

The GNS offers a feature to export the flight plans from the device. On the GNS device, while viewing the Flight Plan Catalog page, press the GPS knob to activate the cursor and select a flight plan in the list.

Then press the **Menu** key and select the **Export Flight Plan?** option. The exported flight plan is saved to the same "FPL" folder with a unique file name.



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<sup>7</sup> The "FPL" folder must reside in the folder equivalent to "GNSAPPPDATA" (see Configuring Alternate Paths chapter for more information).



## Configuration

### Aircraft Configuration

This chapter details the general organization of the settings file. The GTN settings are automatically saved in the file **RealityXP.GNS.ini** located in the aircraft folder. Every time a GTN opens from the Reality XP GTN menu, it creates this self-documented settings file on save.

The INI file consists of sections and keys. The name of a section in the \*.ini file is always entered inside the square brackets. Each section contains several keys (the key must be always assigned to the section that begins in the file before this key). The content of one section ends by a definition of the next section. The name of a key is always on a separate line and the content is assigned by the = char. A line comment starts with the ; char.

```
[GNS]
; comma separated list of gauges
gauges = GNS_530_1, GNS_430_2

[GNS_530_1]
; comma separated list of render targets.
drawto = WINDOW, PANEL2D
; is the master device if true.
MasterDevice = true

[GNS_530_1.WINDOW]
; display window if true.
visible = true

[GNS_530_1.PANEL2D]
; display window if true.
visible = false
```

There are multiple sections in the Reality.GNS.ini file:

- The GNS section contains the gauges key with the content "GNS\_530\_1, GNS\_430\_2. These are the names of the sections for each gauge.
- The GNS\_530\_1 gauge section contains the drawto key with the default content "WINDOW, PANEL2D". These are the names of the sections for each render target.
- The GNS\_530\_1.WINDOW and GNS\_530\_1.PANEL2D render target sections contain the rendering settings.<sup>8</sup>

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<sup>8</sup> Please note you can only configure one window per gauge, but you can configure multiple panels per gauge.

### Advanced Settings

Advanced settings aren't visible in the configuration panel and are only manually editable in the **RealityXP.GNS.ini** settings file in a **[GNS\_###\_#]** section. Any text editor suffice to open and edit the content.

CpuAffinity = -1	selects the CPU running the trainer process: 1 to 32; 0: last core, -1: automatic.
HardwareDevice =	; connects to: 'PFC_STACK', 'PFC_430', 'PFC_530' or any '#PID' (#D002 for PFC_430) no value connects to first found, 'OFF' disables connection.  <i>requires the Reality XP GNS Driver add-on</i>
HardwareIdx = -1	; hardware selector number or -1 to disable.  <i>requires the Reality XP GNS Driver add-on</i>

### Hardware Controllers

The GNS supports a selection of external hardware controllers<sup>9</sup>. When the plug-in loads, it automatically detects the connected hardware and saves the bindings to the "RealityXP.GNS.ini" file in the aircraft folder. The following hardware devices are supported:

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

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<sup>9</sup> X-Plane 32 bits only. Requires separate activation or a hardware enabled version. See reality-xp.com for available options. Existing customers of the GNS Driver don't have to purchase the driver a second time.

### Custom Commands

This chapter describes the list of custom X-Plane commands available to control the GNS from third party plugins. Each command starts with "RXP/GNS/" and ends with the suffix "\_1" for unit #1 or "\_2" for unit #2. For example, the command name for the device #2 "ENT" button is: "RXP/GNS/ENT\_2"

TOGGLE_WINDOW	toggle window visibility
CFLP	press button: COM fLIP
VFLP	press button: NAV flip
CDI	press button: CDI
OBS	press button: OBS
MSG	press button: MSG
FPL	press button: FPL
VNAV	press button: VNAV
PROC	press button: PROC
ENT	press button: ENT
CLR	press button: CLR
MNU	press button: MNU
DTO	press button: DTO
RDN	press button: RNG UP
RUP	press button: RNG DWN

PWR_PUSH	press knob: POWER
PWR_CCW	rotate knob: POWER (counter clock-wise)
PWR_CW	rotate knob: POWER (clock-wise)
VOL_PUSH	press knob: VOLUME
VOL_CCW	rotate knob: VOLUME (counter clock-wise)
VOL_CW	rotate knob: VOLUME (clock-wise)
COM_PUSH	press knob: COM
COM_OUTR_CCW	rotate outer: COM (counter clock-wise)
COM_OUTR_CW	rotate outer: COM (clock-wise)
COM_INNR_CCW	rotate inner: COM (counter clock-wise)
COM_INNR_CW	rotate inner: COM (clock-wise)
GPS_PUSH	press knob: GPS
GPS_OUTR_CCW	rotate outer: GPS (counter clock-wise)
GPS_OUTR_CW	rotate outer: GPS (clock-wise)
GPS_INNR_CCW	rotate inner: GPS (counter clock-wise)
GPS_INNR_CW	rotate inner: GPS (clock-wise)

In addition to custom device commands, the plugin exports the following additional commands designed to work across multiple Reality XP plugins:

"RXP/GPS/MASTER_DEVICE_0	select master device: default GPS
"RXP/GPS/MASTER_DEVICE_1	select master device: Reality XP GPS 1
"RXP/GPS/MASTER_DEVICE_2	select master device: Reality XP GPS 2
RXP/GPS/MASTER_DEVICE_NEXT	select next available master device

### Custom Datarefs

This chapter describes the list of datarefs the GNS publishes to third party plugins. Please note only the "master" device updates these.

```
RXP/radios/indicators/hsi_bearing_deg_mag_pilot
RXP/radios/indicators/hsi_flag_from_to_pilot
RXP/radios/indicators/hsi_hdef_dots_pilot
RXP/radios/indicators/hsi_vdef_dots_pilot
RXP/radios/indicators/hsi_has_dme_pilot
RXP/radios/indicators/hsi_dme_distance_nm_pilot
RXP/radios/indicators/hsi_dme_speed_kts_pilot
RXP/radios/indicators/hsi_dme_time_min_pilot
RXP/radios/indicators/hsi_flag_glide_slope_pilot
RXP/radios/indicators/hsi_display_horizontal_pilot
RXP/radios/indicators/hsi_display_vertical_pilot
RXP/radios/indicators/gps_course_degtm
RXP/radios/indicators/gps_cross_track_nm
RXP/radios/indicators/gps_time_min_eta
RXP/radios/indicators/gps_nav_id
RXP/radios/indicators/gps_discrete_out
```

### Configuring Alternate Paths

The Garmin trainer installation is split in various components, each one in a specific path. This chapter describes supported Windows environment variables<sup>10</sup> to configure alternate trainer paths in a typical scenario.

Set the general trainer application path, that is where the trainer is installed:

```
GNSSIMPATH="C:\Program Files (x86)\Garmin\GNS Trainer\GNS"
```

Set the application data path, that is where it stores the non volatile memory files (where routes, user waypoints and device settings are saved)<sup>11</sup>:

```
GNSAPPDATA="C:\ProgramData\Garmin\GNS Trainer Data\GNS"
```

Set the application database path, that is where to look for all the db files (terrain, obstacle, navigation etc.):

```
GNSNAVDATA="C:\Program Files (x86)\Garmin\GNS Trainer\GNS\DB"
```

---

<sup>10</sup> how to add environment variables: <http://www.kunal-chowdhury.com/2016/09/windows-10-anniversary-update-how-to-edit-environment-variables.html>

<sup>11</sup> The GNSAPPDATA default to the path shown If not manually configured otherwise.

### Configuring Aviation Database File

This chapter describes a procedure when you want or need to use another aviation database file.

Copy the aviation database file to the location of your choice on your hard drive, for example in your "My Documents" folder, with a file name "gns\_db.bin", then add the following Windows environment variable:

```
GNSDBFILE="C:\Users\MyName\Documents\gns_db.bin"
```

### Installing Multiple Garmin Trainers

This chapter describes a procedure when you want or need to install two different versions of the Garmin GNS Trainer on your computer. The Garmin GNS Trainer installer prevents installing two different versions, such as the latest compatible with the Reality XP GNS and an older one. However, the GNS Touch plugin can be configured to use alternate trainer path and data path. Please note the following for dual Trainer installation:

1. Install the trainer for the Reality XP GNS
2. Copy the "GNS" folder located in "C:\Program Files (x86)\Garmin\GNS Trainer\" to the location of your choice, or rename it for example to: "C:\Program Files (x86)\Garmin\GNS Trainer\GNS (3300)\"
3. Add the following Windows environment variables:

name = "GNSSIMPATH" value = "the path to the 'GNS' folder you have chosen above"

for example:

```
GNSSIMPATH="C:\Program Files (x86)\Garmin\GNS Trainer\GNS (3300)\"
```

4. You can uninstall the trainer and reinstall the old one, our GNS simulation will now use the trainer and its data as indicated in your environment variables!

### Third Party Vendor Settings

Third party aircraft vendor might want to prevent users from altering settings which would break the integration. For example, a specific aircraft integration might require the device to be set to 'Copilot' side, and connected to the HSI. The plugin support additional setting to make any entry read-only. When locked, settings appear disable in the configuration panel.

The following key must be manually added in the **RealityXP.GNS.ini** settings file in a **[GNS\_###\_#]** section:

```
locked = CopilotSide, LinkHsi      comma separated list of read only settings. (NB: case sensitive names)
```

## Troubleshooting

This chapter describes solutions available to help troubleshooting problems with the plugin and the Garmin Trainer.

The solution monitors certain key operations and logs runtime data to specific files. When troubleshooting a problem, the first step is to analyze runtime data saved to the log files. The X-Plane plugin logs to the file **"My Documents\rxpGNS.xpl.log"**. The GNS simulation logs to the file **"My Document\rxpGnsSim.dll.log"**.

The GNS simulation support additional settings to help troubleshooting video card drivers, and to report internal Garmin trainer errors. When enabled, the trainer will log additional information to "rxpGnsSim.dll.log"

The following keys must be manually added in the **RealityXP.GNS.ini** settings file in a **[GNS\_###\_#]** section:

```
LogTrainer = 0      1 to enable Garmin Trainer logs.
```

## Tutorial: Upgrade X-Plane 11 Baron 58 GPS

Replacing any aircraft default X-Plane GPS requires a few easy steps. This chapter is a step-by-step guide to replace the aircraft default GPS with the Reality XP GNS 530W/430W V2 on the stock X-Plane 11 Baron 58.

### Find gauge panel coordinates

The first step consists in finding where to draw the gauge to the 3D panel.

1. Start X-Plane 11 with the Baron 58 and wait until the aircraft is ready on the tarmac.
2. Press the **CTRL+ALT+SHIFT+SPACE** keys to save the panel preview snapshot.
3. Select **Plugin | Reality XP GNS | GNS 1 | GNS 530W 1** if not already opened.
4. Exit X-Plane 11.
5. Open the saved panel preview snapshot with any paint program, like "Paint" included in Windows:

XPlane\Aircraft\Laminar Research\Baron B58\cockpit\_3d\-PANELS-\Panel\_Preview.png

6. In the paint program, zoom to the centre section where you find the default GPS screen.
7. Write down corners coordinates (pixels highlighted in red below)

8. compute display width like this: **width** =  
 $(X2 - X1 + 1) = (534 - 275 + 1) = 260^{12}$
9. compute display height like this: **height** =  
 $(Y2 - Y1 + 1) = (550 - 356 + 1) = 195$



<sup>12</sup> When opening the Baron 58 in plane maker, you'll notice the GPS 500 properties show 0.5 scale. The size computed above equals half the genuine XPlane GPS size, which is 520x390 for the GPS500 and 430x240 for the GPS400.

### Add the RXP GNS 530W Gauge to the 3D panel

The second step consists in configuring the GNS 530W to display in the 3D panel.

10. With notepad or any other text editor, open the following file:

```
XPlane\Aircraft\Laminar Research\Baron B58\RealityXP.GNS.ini
```

11. Locate the section header: **[GNS\_530\_1]**

12. Right below the section header, locate the line starting with **drawto = .**

13. Type a new render target to the end of the list<sup>13</sup>. For example: **drawto = WINDOW, Garmin\_530\_screen**

14. Add the following text to create a new section at the end of the file, then save and exit notepad.

```
[GNS_530_1.Garmin_530_screen]
visible = true
nobezel = true
frame.type = PANEL3D
; display position and dimension (left,top,width,height)
frame.rect = 275,668,260,195
```

Note: **frame.rect** is the actual render position and size: **X1** is the **left** value, the **width** and **height** are the value computed in the previous steps. The **top** value is computed like this: ("height of Panel\_Preview.png" - Y1)<sup>14</sup>

### Fly the RXP GNS 530W

15. When you are done, open X-Plane 11, select the Baron 58 and open the GNS 530W 1 configuration panel.

16. Enable **Use X-Plane GPS Commands** option then **Accept** to close the panel.

17. Your GNS 530W displays in the 3D panel, and the bezel knobs and keys are working!



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<sup>13</sup> It is a comma separated list.

<sup>14</sup> In this example: 1024 - 356 = 668



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