



RXP GTN 750/650 TOUCH

User's Manual For X-Plane

Tap into the Future of Avionics!

With GTN 750/650's revolutionary touchscreen interface, you're rarely more than 2 taps away from all of the system's primary functions! The intuitive touchscreen controls and large display give you unprecedented access to high-resolution terrain mapping, graphical flight planning, geo-referenced charting, advanced navigation and more.

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.

July 2019 - Rev. 12

INTRODUCTION	3
Garmin Reference Guides	3
System Requirements	3
GETTING STARTED	4
Installation	4
Plugins Menu	4
Configuration Panel	5
Using The Mouse	5
Gauge Windows	5
FEATURES	6
Devices	6
Radios	6
Autopilot	6
Tcad	6
Taws	6
Integral Lighting	6
Additional Features	6
Discrete Inputs	7
Gps Commands	7
Keyboard Shortcuts	7
Pilotedge Integration	7
Failures Annunciation	8
Checklists	8
Flight Plans And User Waypoints	9
SETTINGS	10
Panel Instruments	10
Device Options	10
Gauge Options	11
Aircraft Flight Manual Supplement (Afms)	12
Other Settings	13
CONFIGURATION	14
Aircraft Configuration	14
Gps Commands	15
Third Party Vendor Settings	15
Simulation Datarefs	16
Control Datarefs	16
Device Embedded Memory	17
Configuring Alternate Paths	17
Configuring Aviation Database Files	18
Installing Multiple Garmin Trainers	18
TROUBLESHOOTING	19
Log Files	19
Debug Settings	19
Miscellaneous	19

Introduction

The Reality XP GTN 750 and GTN 650 Touch 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.

Graphical flight planning capabilities allow you to preview your entire route on the map screen and easily enter new waypoints or modify existing ones. A handy "rubber band" feature lets you grab any leg of your flight plan route and move it to accommodate a deviation to your flight plan.

With the GTN, you can set your standby Com frequency simply by touching the onscreen number pad. Another touch of the screen flip-flops your active and standby frequencies. Recent and favourite user frequencies also are a breeze to access. The GTN also automatically decodes a station's Morse code to provide a positive identification – no aural decoding required.

The GTN can control the simulator audio panel (GTN 750 only) as well as the transponder, with working IDENT and REPLY annunciations. This setup could save you up to 3-inch of panel space versus a typical GNS 430/530 install. In addition, precise course deviation and roll steering outputs can be coupled to the simulator autopilot so that IFR flight procedures may be flown automatically. This includes all ARINC 424 leg types, including NextGen radius-to-fix (RF) legs.

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 GTN 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.

System Requirements

The Reality XP GTN 750/650 Touch requires Laminar Research **X-Plane 11, 10** or **9** for Windows¹.



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

Getting Started

Installation

A plug-in with both² the GTN 750 and the GTN 650 simulation installs to³:

XPlane\Resources\Plugin\rxpGTN\

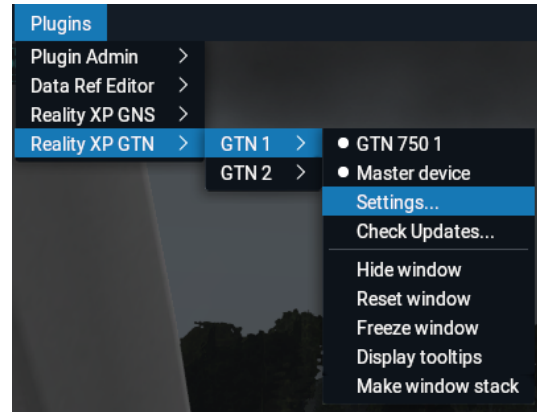
During installation you will be prompted to download and install the Garmin GTN/GDU Trainer⁴. The first time you install this package, or should you need to repair the Garmin Trainer installation, the installer will save a copy of the trainer installer in the following folder:

C:\ProgramData\Reality XP\Common\GtnTrainer\

Plugins Menu

The GTN 750/650 plug-in loads with X-Plane and is operated using the X-Plane Plugins menu.

Select the **menu Plugins | Reality XP GTN** to add or remove a GTN 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-GTN panel installations.
Settings...	Open the configuration panel.
Check Updates...	Check whether 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.
Auto-Hide Window	Removes the popup window from the screen while in external view.
Popout Window	Toggles the window between popup (in-sim) and popout (detached) modes.
Display tooltips	Show or hide mouse tooltips.
Make window stack	Make a stack of aligned windows with this device on top and the other below.

² The same plugin file installs both but it requires purchasing and installing both products to unlock both GTN models.

³ X-Plane 9: "Resources\Plugin\rxpGTN.xpl"

⁴ Compatible trainer versions: v6.62, v6.50.x, v6.21

Configuration Panel

The Reality XP GTN offers a wide variety of configuration options in order to control the way each device operates and integrates in the aircraft. Most device configuration options are available in the configuration panel.

Press and hold the SHIFT key, then RIGHT-Click the top edge of a GTN device to open the configuration panel⁵.

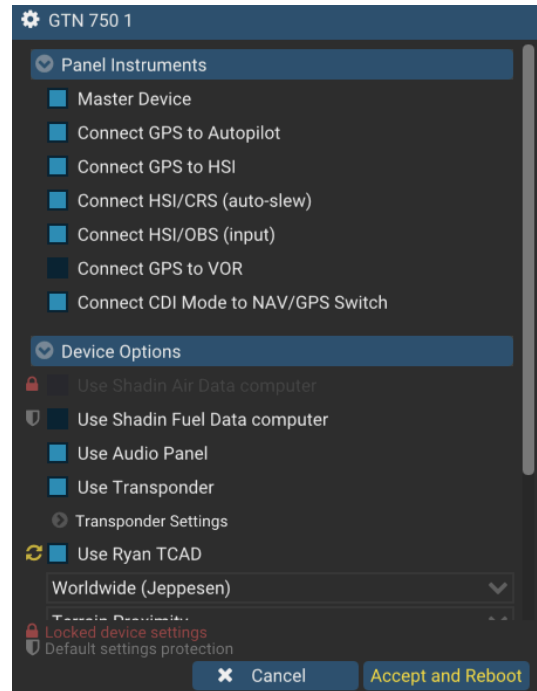
The panel saves the settings to the **RealityXP.GTN.ini** configuration file in the aircraft folder. When reloading the aircraft the plugin reads this file and restores the device settings, including window size and position.

Lock and Shield icons indicate settings restrictions. Read more about these in the *Third Party Vendor Settings* chapter.

Reboot icon shows when settings changes will reboot the device.

Drag and Drop any RealityXP.GTN.ini file onto the panel window. All settings for the same device found in the dropped file will be imported.

At the bottom of the options is a check box to Optimize the Settings File. It is designed to remove comments and leave only the necessary values to minimize file size. While this option is selected, the panel will overwrite the aircraft settings file after you make changes and click the Accept button. When the check box is cleared, the Accept button at the bottom of the panel changes to a Save button and all values you set in the panel are saved. This may result in a larger .ini file size.



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.
- Touchscreen actions are carried naturally with single clicks or click-and-drag. Mouse wheel simulates pinch-in and pinch-out actions.

Gauge Windows

Grab any popup window edge to resize and maintain the original gauge aspect ratio. **Press and hold the SHIFT key** while resizing to relax the aspect ratio constraint. Grab the bezel to move the popup window, or the window top edge if the gauge is displaying without any bezel.

Press and hold the SHIFT key then LEFT-Click the window top edge to scale the window to either 1:1 or 2:1 native screen resolution⁶.

⁵ **SHIFT+LEFT Click** for **XP10** and **XP9**. The settings panel also opens with menu: **Plugins | Reality XP GTN | GTN # | Settings...**

⁶ Requires X-Plane 11 minimum.

Features

Devices

The **GTN 750** plugin includes the **GTN 725**, similar in form and function to the 750, it is a radio-less sibling and fits panels already equipped with radios. Similarly, the **GTN 650** plugin includes both the **GTN 635** and the **GTN 625**.

Radios

The GTN 750 and the GTN 650 can control the simulator COM and NAV audio panel volumes using the **Volume knob** (XP10+ only).

With X-Plane 11.30+ ATC system, the GNS COM box automatically annunciates the **RX flag** when receiving audio and the **TX flag** when transmitting audio

Autopilot

The GTN 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**. It controls the simulator A/P system both horizontally and vertically.

TCAD

The GTN embeds a **Ryan 9900BX TCAD (Traffic Collision Alerting Device)** simulation. It is an authentic TCAS II Mark 7 simulation passing the 250 TSIM tests. Take full control of the TCAD detection shields, view nearby traffic and take actions upon visual and aural TA advisories directly on the GTN touchscreen. The X-Plane multiplayer datarefs feed the TCAD simulation.

TAWS

The GTN offers **TAWS-A, TAWS-B, HTAWS and TERR Proximity modes** with advanced settings available to fine tune the capabilities depending on the aircraft configuration. When configured to operate in TAWS-A mode, the GTN gauge automatically detects best V_{REF} , V_{FE} and V_{LE} . The GTN also connects to the flaps and the gear in order to adjust detection sensitivity and operating limits depending on the phase of flight.

Integral Lighting

Select whether you prefer **constant or adjustable brightness**. The later can use any of the 6 available X-Plane standard rheostats. The plug-in integrates with the X-Plane panel system and provides adjustable integral lighting through the default X-Plane integral lighting rheostats.

Additional Features

The GTN offers deep integration such as setting the **touchscreen 'click' sound volume** or adjusting the **screen backlight level** directly on the unit. Please refer to the 'Garmin GTN Cockpit Reference Guide'



Discrete Inputs

Each device supports discrete inputs, via keyboard shortcuts, custom commands or the default GPS commands. These control some of the GTN operation: **Toggle CDI source, Toggle OBS mode and TAWS Inhibit.**

GPS Commands

The GTN may be configured to also intercept all of the default X-Plane GPS commands. Open the settings panel then select "Use Default GPS Commands" advanced gauge option. The GTN intercepts the following:

- GPS COM knobs control the GTN FMS knobs (lower right).
- GPS CRS inner knob controls the GTN Volume knob (upper left).
- DTO key controls the GTN DTO key.
- MENU key controls the GTN HOME key.
- CDI controls CDI mode, OBS controls OBS mode.
- Other GPS keys are disabled.

In addition the plugin provides its own set of X-Plane commands.

Keyboard Shortcuts

Keyboard shortcuts are found by opening the X-Plane settings screen and going to the Keyboard tab. You can bind a combination of keys with a published GTN command. These commands support press, hold and release actions. The GTN may also be configured to intercept keyboard shortcuts using the X-Plane Plugin Admin Menu. These are managed by the GTN plugin and saved in a "RealityXP.GTN.ini" file located in the X-Plane preference folders, but they only support press-and-release actions.

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 PilotEdge⁷ instantly creates the same mental environment you find yourself in when you fly a real airplane.

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

⁷ <https://www.pilotedge.net>

Failures Annunciation

When enabled in the configuration panel, the GTN plugin uses the following datarefs⁸ as failures sources:

sim/operation/failures/rel_gps sim/operation/failures/rel_gps2 sim/operation/failures/rel_g430_gps1 sim/operation/failures/rel_g430_gps2	Satellite reception failure, displays: "No GPS Position"
sim/operation/failures/rel_gp RXP/operation/failures/rel_waas_gps1 RXP/operation/failures/rel_waas_gps2	Differential GPS failure, reduces location accuracy: satellite reception mode switches to 3D only.
RXP/operation/failures/rel_raim_gps1 RXP/operation/failures/rel_raim_gps2	RAIM check failure.
sim/operation/failures/rel_com1 sim/operation/failures/rel_nav1 sim/operation/failures/rel_navcom1	COM radios failure only. NAV radios failure only. Both COM and NAV radios failure.
sim/operation/failures/rel_xpndr	Transponder failure.
sim/operation/failures/rel_marker	Audio Panel failure.



NB: professional licenses provide additional datarefs to override GPS receiver mode, WAAS solution, dilution of precision, position uncertainty and figure of merit.

Checklists

The Checklists function provides a built-in method of reviewing your aircraft checklist. As each Checklist is completed, you can advance to the next one in order. In the Checklist Menu, you can access any Checklist, or group of Checklists, and clear the current or all Checklists.

Checklists are created using the Garmin Checklist Editor software⁹ and must be saved to a file named **checklist.gtn**¹⁰ into the aircraft folder. To get started, a sample pack installs to the following folder:

```
"C:\ProgramData\Reality XP\Common\GtnTrainer\checklists.zip"
```

Unzip the "checklists.zip" archive file to extract the sample ".ace" checklists files, then copy one of these to the aircraft folder and rename the file to checklist.gtn. On the GTN device, while viewing the Utilities page group, touch the **Checklists** key to start the Checklists function. Touch the **Menu** key to select an option from the Menu.



⁸ datarefs starting with 'RXP' use the same 'failure' values as X-Plane datarefs (0: normal, 6: inop). See 'Control Variables' p12 for complete list.

⁹ Available online: https://www8.garmin.com/support/download_details.jsp?id=5075

¹⁰ Supports both "checklist.ace" and "checklist.gtn"

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 GTN. The imported flight plans can then be previewed, used directly or stored to the GTN flight plan catalog. This chapter describes how to enable and use this feature¹¹.

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 **FPLN** and be located in the GTN Trainer Data folder, typically¹²:

```
"C:\ProgramData\Garmin\Trainers\Databases\FPLN"
```

Alternatively, this can be a "FPLN" shortcut linked to any other folder on the hard drive, for example:

1. Create a folder "Documents\GTN Flight Plans" where to copy the flight plan files and user waypoints file.
2. Open "C:\ProgramData\Garmin\Trainers\Databases\", right-click the empty area to the right, select **new | shortcut**
3. Name the shortcut "FPLN" and select the browse button
4. Browse to select the "Documents\GTN Flight Plans" folder and press OK.

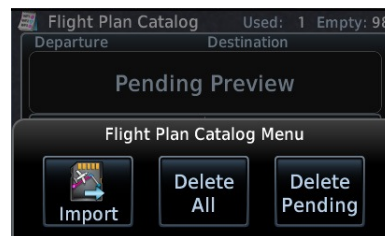
The second step is to create one or more flight plan files with the ".gfp" file extension and one "user.wpt" file. The product comes with a starter pack installed into the following folder:

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

Importing flight plans

The last step is to import the flight plans and the user waypoints into the GTN device. To proceed with the starter pack, unzip the "flightplans.zip" archive file to extract the "KSLE_KSLE.gfp" flight plan and the "user.wpt" sample files, then copy the two files to the "FPLN" folder.

On the GTN device, while viewing the Flight Plan page, touch the **Menu** key and then the **Catalog** key to display the Flight Plan Catalog.



An Import key will be present in the Catalog menu bar when flight plans are present on the virtual datacard folder. Touch the **Catalog Menu** key, then the **Import** key to open a pop-up with a list of the file names of the flight plans on the datacard, then select the desired flight plan to import.

Importing user waypoints

The GTN can import user generated waypoints from a file on the datacard. The created waypoints will be at the latitude and longitude specified in the file with the specified name and comment.

When a "user.wpt" user waypoint file is present in the virtual datacard FPLN folder, a key will be available on the Waypoint Info page for importing user waypoints. From the Waypoint Info page, touch the **Import Waypoints** key. Touch **OK** to acknowledge the pop-up to import all of the user waypoints in the file.

¹¹ See "GTN Flight Plan and User Waypoint transfer.pdf" guidelines for how to create text based flight plan files (included in the starter pack).

¹² The **FPLN** folder must reside in the folder known as **GTNNAVDATA** (GTN Trainer 6.50+) or **GTNAPPDATA** (previous versions). See Configuring Alternate Paths chapter for the meaning and location of the trainer known folder names.
Trainer 6.21: "C:\ProgramData\Garmin\GTN Trainer Data\GTN\FPLN".

Settings

This chapter describes how to customize your GTN devices to the specific requirements of your aircraft. In settings you will be able to selectively link devices to panel instruments, configure devices capabilities, and adjust or configure other options¹³:

- Configure functionality and the user interface.
- Manage the settings which are specific to each aircraft.
- Modify each device settings independently.

Panel Instruments

Each GTN device has the ability to connect to different groups of panel instruments depending on the aircraft. The instruments connections can be added and removed depending on the aircraft panel gauges capabilities and the requirements of the user. Panel Instruments settings will configure the connections with the most common settings automatically.

Master Device	Each device connects to different instruments independently (example: GPS1 to VOR1 and GPS2 to VOR2). The Master Device will take exclusive access when two or more devices are sharing the same connection (like the autopilot).
Connect GPS to Autopilot	Select if the device commands the flight director roll and pitch when in GPS mode.
Connect GPS to HSI	Select if the device overrides the HSI instrument (HSI datarefs) <i>See Gauge Options to select pilot or copilot side.</i>
Connect HSI/CRS (auto-slew)	Select if the device auto-slew the HSI Course Selector when the DTK changes.
Connect HSI/OBS (input)	Select if the device uses the HSI OBS Selector for input when in OBS mode. <i>Only if the device is connected to HSI.</i>
Connect VOR#/OBS (input)	Select if the device uses the VOR OBS Selector for input when in OBS mode <i>Only if the device isn't connected to HSI.</i>
Connect GPS to VOR# indicator	Select if the device overrides the aircraft VOR indicator (NAV datarefs). <i>See Gauge Options to select VOR1 or VOR2.</i>
Connect CDI Mode to NAV/GPS Switch	Select if the device CDI mode controls the aircraft NAV/GPS switch source. <i>See Gauge Options to select NAV1 or NAV2.</i>

Device Options

Each GTN has settings to allow customization of some of the device features. Each device embeds optional equipment which is used to augment navigation capabilities and pilot awareness. The most used settings are enabled by default.

Use Shadin Air Data computer	Simulate a Shadin Air Data computer by providing external air sensor data.
------------------------------	--

¹³ **SHIFT+RIGHT Click the top edge of a GTN device** to open the configuration panel (SHIFT+LEFT Click for XP10 and XP9).
The settings panel also opens with menu: **Plugins | Reality XP GTN | GTN # | Settings...**

REALITY XP GTN 750/650 TOUCH X-PLANE

Use Shadin Fuel Data computer	Simulate a Shadin Fuel Data computer by providing external fuel sensor data.
Use Audio Panel	Simulate a GMA 35 Audio Panel and enable touchscreen audio panel interface.
Use Transponder	Simulate a GTX 327 Transponder and enable touchscreen interface. <i>Additional settings may appear when changing mode.</i>
Transponder Settings	Select which VFR code will be used: User Defined, 1200 (US), 7000 (EUR) <i>User defined code can be manually set; see "Other Settings" below.</i>
Use Ryan TCAD	Simulate a Ryan 9900BX TCAD (Traffic Collision Alerting Device) by providing surrounding traffic and collision alerts.
Database Type	Select which database file included with the Garmin GTN trainer will be used: Worldwide, North America, Americas Rotor (Jepp), North Am. Rotor (Grmn)
TAWS Mode	Select which terrain alerting mode will be used: Terrain Proximity, TAWS-B, TAWS-A <i>The alerting algorithm adapts the terrain alerting criteria based on nearby airports.</i>
TAWS Settings	The device must be configured to specify the minimum criteria that an airport must meet to be considered as a nearby airport for the purpose of TAWS/Terrain alerting: – Select the type of runway surface that the aircraft will typically use:

Gauge Options

These settings adjust the way the plugin is integrating the GTN with the flight simulator and the aircraft panel. You can adjust options for a number of features that affect your in-cockpit integration and experience.

Cockpit Side	Select which cockpit side the device connects to: Pilot, Copilot <i>This sets which HSI and NAV instruments datarefs the device will override.</i>
Radios	Select which radios the device synchronizes with: COM1/NAV1, COM2/NAV2
VLOC Source	Select which nav source the device connects to: Auto, NAV1, NAV2 <i>This sets both NAV/GPS switch source and the VOR datarefs the GNS will override.</i>
GPS Source	Select which X-Plane GPS system the device replaces: Auto, GPS1, GPS2 <i>This sets which GPS datarefs the device will override.</i>
Fuel Type	Select which fuel type the fuel data sensor is probing: AVGAS, JET-A, JET-B, DIESEL <i>This sets the fuel density to convert weight to volume.</i>

REALITY XP GTN 750/650 TOUCH X-PLANE

Ownship Icon	Select which aircraft symbol will display on the map page. <i>The "Auto" mode selects the symbol using the number of engines and the aircraft type.</i>
Power Source	Select which power source the GPS is using: Auto, Always On, Avionics Bus, Main Battery, Bus #1 to #6 <i>X-Plane Avionics Bus and Main Battery datarefs may being "on" even if power is off.</i>
Clock Source	Select the GPS clock time source: Simulator, Computer
Display Settings	Define the device integral lighting options:
Screen Button	– Use the square box to select the mode: Brightness, Rheostat
Use Half-Rate Screen Update	– Adjust the brightness (0 to 100%) or set the rheostat array dataref index – Select whether the screen draws every other frame to preserve resources. <i>Most 3rd party aircraft provide rheostat buttons which are using the standard datarefs.</i>
Audio Settings	Define the device sound options:
Voice Type	Select the voice type: Female, Male
Master Volume	Adjust TAWS and GPWS volumes: 0 to 100%
TCAD Volume	Adjust TCAD volume: 0 to 100%
With Window Focus	Select whether the device play sounds only if X-Plane window has the focus.
Advanced Settings	Define specific operational, input and output features:
Enable Failures	Select if the device supports failures <i>See the Failures Annunciation topic for more details.</i>
Use Simulator AI Traffic Count	Select if the TCAD will monitor only active X-Plane AI aircraft. <i>You may need to disable this option when flying online.</i>
Use Simulator GPS Commands	Select if the device will use the X-Plane GPS button and knob commands. <i>The device will intercept and use any GPS button which is typically used in 3D panels.</i>
Auto-Update Simulator GPS Waypoints	Select if the device overrides X-Plane GPS/FMS legs with its own waypoints. <i>This may be used to display the device route waypoints into 3rd party EFIS.</i>
Auto-Save Active Route	Select if the device saves the active route to a file when it changes. <i>The file will be saved to: "X-Plane\Output\FMS plans\Reality XP GTN# Route.fms"</i>
HSI Deviation	Set the horizontal and vertical needle deflection scale. <i>This may be used to adjust the device output to 3rd party aircraft HSI/PFD gauges.</i>

Aircraft Flight Manual Supplement (AFMS)

The GTN supports enablement features, configured during installation in a real aircraft. Unless explicitly required you shouldn't modify any of these. You can find more detailed information in the official Garmin Installation Manuals.

CDI Key	Disabled: this causes the field above the CDI key to always display GPS, regardless of CDI key presses.
---------	--

REALITY XP GTN 750/650 TOUCH X-PLANE

Selected Course for GPS	<p>Disabled: ignore a selected course input for GPS operation in OBS mode. When OBS mode is selected, the course is entered on the controls of the GPS unit. <i>This setting is included for completeness only and has no practical use in X-Plane.</i></p>
Selected Course for VLOC	<p>Disabled: ignore the selected course input such that the VOR valid flag is only dependent on a valid VOR signal (lateral deviation calculated by another device). <i>This setting is included for completeness only and has no practical use in X-Plane.</i></p>
V-Flag Declutter	<p>Declutter: whenever vertical deviation is invalid, the vertical deviation bar is parked in the maximum UP position and the vertical flag is removed from view, except in the following cases: (i) the CDI is in VLOC mode and an ILS frequency is tuned, or (ii) the CDI is in GPS mode and a GPS approach with vertical guidance is active. In these cases, whenever the vertical deviation is invalid, the vertical deviation bar parks in the entered position and the vertical flag is shown.</p> <p>This will determine if the transition into approach mode is automatic or requires pilot acknowledgement of a message prompt.</p>
GPS Selected	<p>Prompt: when in GPS mode, the GPS Select discrete is active whenever an approach mode is active and the pilot has enabled the A/P APR Outputs (an associated message is displayed). This mode prevents the pilot to select automatic GPS to ILS CDI transitions on the AUX CDI/ALARMS page. <i>For Honeywell (Bendix/King) KFC 225 and KAP 140 using the GNS discrete signal.</i></p>
Engage Autopilot APPR	<p>Enabled: automatically arm the autopilot approach mode when the A/P APR Outputs are active. <i>This is not a GNS device feature but a Reality XP option added for convenience.</i></p>
Airspace Labels	<p>Enabled: The Airspace Label feature shows the United States airspace system altitude limits up to a selected range.</p>
Vertical Navigation Type	<p>Select which vertical navigation assistance GPS is using: VCALC, VNAV <i>VNAV is a new vertical navigation feature introduced with GTN software v6.50</i></p>
Transition To Approach (VNAV)	<p>– Enabled: attempts a smooth transition from en route to approach vertical guidance. Aircraft intercepts with approach guidance from below the glidepath. – Disabled: en route VNAV terminates at the waypoint prior to the FAF on approaches with vertical guidance, or at the FAF (LNAV only).</p>
RF Procedure Legs	<p>Enabled: fly Instrument Approach Procedures (IAPs) with radius-to-fix (RF) legs.</p>
Mark On Target	<p>Enabled: additional user interface for handling mark on target waypoints will be present. <i>This setting enables the MARK ON TARGET command.</i></p>

Other Settings

Use any text editor and manually add any of these in the **RealityXP.GTN.ini** file in the aircraft folder, in a **[GTN_###_#]** section.

CpuAffinity = -1

Select the CPU which will run the Garmin trainer in the background:
1 to 32 (CPU#), 0 (last core), -1 (auto)

VFRCode = #1200

Select the transponder code for VFR.

Configuration

Aircraft Configuration

This chapter details the general organization of the settings file. The GTN settings are automatically saved in the file **RealityXP.GTN.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 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.

```
[GTN]
; comma separated list of gauges
gauges = GTN_750_1, GTN_760_2

[GTN_750_1]
; comma separated list of render targets.
drawto = WINDOW, PANEL2D
; is the master device if true.
MasterDevice = true

[GTN_750_1.WINDOW]
; display window if true.
visible = true

[GTN_750_1.PANEL2D]
; display window if true.
visible = false
```

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

- The **GTN** section contains the gauges key with the content "GTN_750_1, GTN_750_2. These are the names of the sections for each gauge.
- The **GTN_750_1** gauge section contains the **drawto** key with the content "WINDOW, PANEL2D". These are the names of the sections for each render target.
- The **GTN_750_1.WINDOW** and **GTN_750_1.PANEL2D** render target sections contain the rendering settings¹⁴.

¹⁴ Please note you can only configure one window per gauge, but you can configure multiple panels per gauge.

GPS Commands

This chapter describes the list of custom X-Plane commands available to control the GTN with hardware controllers. Each command exists with a "_1" suffix for unit #1, and "_2" suffix for unit #2.

RXP/GTN/DT0	press button: Direct To
RXP/GTN/HOME	press button: Home
RXP/GTN/VOL_PUSH	press knob: VOL
RXP/GTN/VOL_CCW	rotate knob: VOL (counter clock-wise)
RXP/GTN/VOL_CW	rotate knob: VOL (clock-wise)
RXP/GTN/FMS_PUSH	press knob: FMS
RXP/GTN/FMS_OUTER_CCW	rotate knob: FMS (counter clock-wise)
RXP/GTN/FMS_OUTER_CW	rotate knob: FMS (clock-wise)
RXP/GTN/FMS_INNER_CCW	rotate knob: FMS (counter clock-wise)
RXP/GTN/FMS_INNER_CW	rotate knob: FMS (clock-wise)
RXP/GTN/CDI_SOURCE	toggle CDI source (discrete input)
RXP/GTN/OBS_MODE	toggle OBS mode (discrete input)
RXP/GTN/TAWS_INHIBIT	inhibit TAWS (discrete input)
RXP/GTN/MARK_ON_TARGET	mark current position (discrete input - requires AFMS Mark On Target Enabled)
RXP/GTN/TOGGLE_WINDOW	toggle window visibility
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

Third Party Vendor Settings

Third party aircraft vendor may want to **lock settings** and prevent user changes in the GUI settings panel, or to ensure the device starts up with **default values** like pre-configured 3D cockpit rendering position and size. When configured, locked settings appear disabled with red lock icon in the GUI settings panel. Default settings appear with a grey shield icon and reset to their default value every time the device reloads.

🔒 How to configure default settings: create a **RealityXP.GTN.defaults.ini** file in the aircraft folder with only the sections, keys and values you want to override as defaults.

🔒 How to configure locked settings: manually add 'locked' in a **[GTN_###_#]** section in the **RealityXP.GTN.ini** settings file. For example, an aircraft requires the device to be set to 'Copilot' side and connected to the HSI:

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

Simulation Datarefs

This chapter describes the list of additional sim variables the GTN publishes to third party add-ons. There are three sets of variables representing different Reality XP sources: any GPS #1 (GTN or GNS V2), any GPS #2 and any Reality XP Master Device. Variable names start with "**RXP/radios/indicators/**" followed by a base name and a suffix indicating the source:

Variable Name (any RXP GPS)	Type	Units	Suffix	Remarks
hsi_bearing_deg_mag	float	degrees	_1 _2 _pilot	suffix: GPS#1, GPS#2, Master Device
hsi_flag_from_to	int	enum	_1 _2 _pilot	
hsi_hdef_dots	float	dots	_1 _2 _pilot	
hsi_vdef_dots	float	dots	_1 _2 _pilot	
hsi_has_dme	int	boolean	_1 _2 _pilot	
hsi_dme_distance_nm	float	miles	_1 _2 _pilot	
hsi_dme_speed_kts	float	knots	_1 _2 _pilot	
hsi_dme_time_min	float	minutes	_1 _2 _pilot	
hsi_flag_glideslope	int	boolean	_1 _2 _pilot	
hsi_display_horizontal	int	boolean	_1 _2 _pilot	
hsi_display_vertical	int	boolean	_1 _2 _pilot	
gps_course_deg_tm	float	degrees	_1 _2	no suffix for Master Device 'gps_' vars
gps_cross_track_nm	float	miles	_1 _2	
gps_time_min_eta	float	minutes	_1 _2	
gps_discrete_out	int	bitfield	_1 _2	
gps_nav_id	string		_1 _2	
gps_unit	enum		_1 _2	4 chars encoded device id or 0 ¹⁵
Variable Name (RXP GTN only)				
gtn_unit1	enum			4 chars encoded device id or 0
gtn_unit2	enum			4 chars encoded device id or 0
gtn_version	enum			version num (ex: v2.5.10.0 = 0x02050A00)

Control Datarefs

Third party plug-ins can interact with the following datarefs to further enhance GTN integration with the aircraft:

RXP/operation/failures/rel_waas_gps1(2)	failure enum	(inop: 6) <i>alternative to "rel_gp"</i>
RXP/operation/failures/rel_raim_gps1(2)	failure enum	(inop: 6)
RXP/operation/failures/rel_com1(2)	failure enum	(inop: 6)
RXP/operation/failures/rel_nav1(2)	failure enum	(inop: 6)
RXP/operation/failures/rel_navcom1(2)	failure enum	(inop: 6)
RXP/gps/dscrt_in/obs_mode_sel_1(_2)	boolean	discrete in signal (write 1 to trigger)
RXP/gps/dscrt_in/taws_inhib_1(_2)	boolean	discrete in signal (write 1 to trigger)
RXP/gps/dscrt_in/cdi_src_1(_2)	boolean	discrete in signal (write 1 to trigger)
RXP/gps/dscrt_in/mute_actv_caut_1(_2)	boolean	discrete in signal (write 1 to trigger)
RXP/gps/dscrt_in/mark_on_target_1(_2)	boolean	discrete in signal (write 1 to trigger)

Please note: third party plugins can write 1 to any "RXP/gps/dscrt_in/xxxx" and trigger the input signal. The GTN reverts the value to 0.

¹⁵ **GTN:** 'G621' (0x31323647), 'G622' (0x32323647), 'G631' (0x31333647), 'G632' (0x32333647), 'G651' (0x31353647), 'G652' (0x32353647), 'G721' (0x31323747), 'G722' (0x32323747), 'G751' (0x31353747), 'G752' (0x32353747)

GNS: 'G401' (0x31303447), 'G402' (0x32303447), 'G421' (0x31323447), 'G422' (0x32323447), 'G431' (0x31333447), 'G432' (0x32333447), 'G501' (0x31303547), 'G502' (0x32303547), 'G531' (0x31333547), 'G532' (0x32333547)

Device Embedded Memory

The GTN Trainer stores all user settings in a file similarly to a real device using embedded non-volatile memory. Settings include user preferences such as displayed navigation units, map settings, routes catalog and the user waypoints. They are saved in the following folder:

```
C:\ProgramData\Garmin\Trainers\GTN\nonvol          (GTN Trainer 6.50+)
C:\ProgramData\Garmin\GTN Trainer Data\GTN\GTN1nonvol (GTN Trainer 6.21 and below)
```

The Reality XP GTN simulation manages individual non-volatile memory file copies, one per-device and per-unit. These are saved in the same folder next to the original file, using the following file name convention:

```
sys_nand0      : default original file.
sys_nanda, sys_nandb: GTN 625 #1 and GTN 625 #2
sys_nandc, sys_nandd: GTN 635 #1 and GTN 635 #2
sys_nande, sys_nandf: GTN 650 #1 and GTN 650 #2
sys_nandg, sys_nandh: GTN 725 #1 and GTN 725 #2
sys_nandi, sys_nandj: GTN 750 #1 and GTN 750 #2
```

Should you want to backup and restore the settings, you just need to make a copy of the corresponding file(s) listed above to a safe location, then copy them back to the aforementioned folder to restore.

The simulation automatically creates and manages per-device/per-unit nonvol file. In addition, should the original `sys_nand0` file is missing, the GTN Trainer recreates it from scratch. When upgrading from one trainer version to the next, the setting files are upgraded automatically as well.

Configuring Alternate Paths

The Garmin trainer installs various components, each one in a specific path. This chapter describes supported Windows environment variables¹⁶ to configure alternate trainer paths in a typical scenario.

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

```
GTNSIMPATH="C:\Program Files (x86)\Garmin\Trainers\Packages\GTN\bin" (Trainer v6.50+)
GTNSIMPATH="C:\Program Files (x86)\Garmin\GTN Trainer\GTN\sys\sim" (older Trainers)
```

Set parent path to trainer data files (Resources, Audio, etc.):

```
GTNAPPPDATA="C:\Program Files (x86)\Garmin\Trainers\Packages\GTN\data" (Trainer v6.50+)
GTNAPPPDATA="C:\ProgramData\Garmin\GTN Trainer Data\GTN" (older Trainers)
```

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

```
GTNNAVDATA="C:\ProgramData\Garmin\Trainers\Database" (Trainer v6.50+)
GTNNAVDATA="C:\ProgramData\Garmin\GTN Trainer Data\DB" (older Trainers)
```

¹⁶ how to add environment variables:

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

Configuring Aviation Database Files

Copy the aviation database file and/or the obstacle database file to the location of your choice on your hard drive, for example in "My Documents" folder, then add the following Windows environment variable for the aviation and obstacles files respectively (in this example the aviation db file is renamed to gtn_db.bin):

```
GTNADBFIL="C:\Users\MyName\Documents\gtn_db.bin"           (alias: GTNDBFILE)
GTNODBFILE="C:\Users\MyName\Documents\terrain.odb2"      (alias: GTNOBSTCL)
```

Installing Multiple Garmin Trainers

This chapter describes a procedure when you want or need to install two different versions of the Garmin GTN Trainer on your computer. The Garmin GTN Trainer installer prevents installing two different versions, such as the latest compatible with the Reality XP GTN Touch and an older one. However, the GTN 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 GTN Touch
2. Copy the "sim" folder located in "C:\Program Files (x86)\Garmin\GTN Trainer\GTN\sys\" to the location of your choice¹⁷, or rename it for example to: "C:\Program Files (x86)\Garmin\GTN Trainer\GTN\sys\sim (6210)\"
3. Copy the "GTN Trainer Data" folder located in "C:\ProgramData\Garmin\" to another location, or just rename it to something like: "C:\ProgramData\Garmin\GTN Trainer Data (6210)"
4. Add the following 2 environment variables in Windows:
name = GTNSIMPATH value = *the path to the 'sim' folder you have chosen above*
name = GTNAPPDATA value = *the path to the 'data' folder you have chosen above*
for example:

```
GTNSIMPATH="C:\Program Files (x86)\Garmin\GTN Trainer\GTN\sys\sim (6210)\"  
GTNAPPDATA="C:\ProgramData\Garmin\GTN Trainer Data (6210)"
```

5. You can now uninstall the trainer and reinstall the old one: the GTN plugin will use the trainer and its data from the location indicated in your environment variables.

¹⁷ Please note you only need to copy or rename this folder for the GTN plugin, but you'll need the rest for our G500/600

Troubleshooting

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

Log Files

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 Plugin log file: **"My Documents\rxpGTN.xpl.log"**.

The GTN Simulation log file: **"My Document\rxpGtnSim.dll.log"**

Debug Settings

The GTN 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 "rxpGtnSim.dll.log"

The following keys can be manually added in the **RealityXP.GTN.ini** settings file in a **[GTN_###_#]** section:

LogTrainer = 0	1: enable Garmin Trainer logs. 2: enable Garmin Trainer crash report handler (trainer 6.50+ only). 4: enable Trainer version and paths logs. 7: enable all the above (1+2+4 = 7)
DebugValue = 0	1: enable Video Card Driver debug logs. 2: render power-off screen in red.

Miscellaneous

Anti Virus / Windows Security / Windows Defender Security Center

Windows security and Antivirus or Malware scanners are known to flag the Reality XP files as dangerous from time to time. Should the product doesn't work as expected, or refuses to run, please make sure to review your anti-virus protection for any 'RXP' quarantined files. The solution it to recover the file(s) from the quarantine of the antivirus and to set an exclusion for it so it will not be deleted anymore.

How to allow blocked apps by the Windows 10's ransomware protection

Windows Security lets you manage all your security needs, including Windows Defender Antivirus and Windows Defender Firewall. Controlled folder access can help prevent ransomware and other destructive malware from changing your personal files. Sometimes apps that you normally use might be blocked from making changes to common folders like Documents.

Starting with the Windows 10 October 2018 Update (version 1809), the feature has updated with a new option to quickly allow recently blocked applications without the need to disable the security feature just because of a false positive.

To access Controlled folder access controls, select Start > Settings > Update & Security > Windows Security > Virus & threat protection. You should then select Manage settings, and under Controlled folder access, then select Manage Controlled folder access. From there set Controlled folder access to on or off.

Within Windows 10 Windows Security you can now allow a recently blocked app by opening "Virus & Threat protection" within the Windows Security app, clicking "Ransomware protection" and then going through to "Allow an app through Controlled folder access". The new option to add "Recently blocked apps" will appear in a popup.

Intel integrated Graphics vs Discrete Graphics card

The Garmin trainer "GTN Simulator.exe" process must use discrete graphics instead of the integrated otherwise the Intel drivers exhibit bugs and/or black screen symptoms (systems with Intel graphics only should run fine).

Force App To Use NVIDIA Graphics Card

- Open the NVIDIA control panel. Right-click on an empty area on your desktop and select the 'NVIDIA Control Panel' option from the context menu.
- Go to the Desktop menu and enable the 'Add "Run with graphics processor" to Context Menu' option.
- Return to your desktop. Right-click the app you want to force to use the dedicated GPU. The right-click context menu will have a 'Run with graphics processor' option. Select 'High-performance NVIDIA processor' from the sub-options and the app will run using your dedicated GPU.

Force App To Use AMD Graphics Card

- Open the AMD Catalyst Control Center app by right-clicking on an empty area on your desktop. Select 'Catalyst Control Center' from the context menu. From the list of panels on the left, select 'Power'. Under 'Power', select 'Switchable application graphics settings'.
- Here you will see a list of apps that AMD already recognizes as needing better GPU support. On this panel is an 'Add Application' button. Click it and select the EXE of the app you want to force to use the AMD graphics card.
- After you add the application, open the dropdown next to it for setting graphics options. Select 'High performance' and you're done. The app will always use AMD graphics card.



This manual is intended for Flight Simulation use only, and may not be used in any real world aviation applications. The authors are not responsible for any errors or omissions. The information and data given in this user manual can be changed without prior notice. No part of this manual may be reproduced in any form or by any means without the written permission of the publisher, regardless of which method or which instruments, electronic or mechanical, are used. All technical information, drafts, etc. are liable to law of copyright protection.

Inclusion of Garmin copyrighted material in this presentation does not imply any endorsement by Garmin Ltd or its affiliates of the flight training material provided by Reality XP. Please note that Garmin Ltd. or its affiliates owns the copyright to this material and it is reproduced by permission.