SIAI-Marchetti SF.260D
powered by
Reality Expansion Pack

v4.8.12

July 23, 2025

Contents

AIRCRAFT GENERAL DESCRIPTION

The SIAI-Marchetti SF.260 is an Italian light aircraft which has been commonly marketed as a military trainer and aerobatics aircraft.

It is know as the “Ferrari of the sky” for its slick appearance and its relatively high cruise speed.

The SF.260 was designed by Italian aircraft designer Stelio Frati, while production work originally performed by Milan-based aviation manufacturer Aviamilano. On 15 July 1964, the first prototype performed its maiden flight (then designated F.260). Shortly thereafter, responsibility for production was transferred to SIAI Marchetti, who had purchased the rights to the design. Manufacturing continued to be performed by this firm until the company was bought by Aermacchi in 1997.

The SF.260 has been largely sold to military customers as a trainer and light combat aircraft. The Italian Air Force (Aeronautica Militare) and the Belgian Air Force (Composante air de l’armée belge) make a large use of the SF.260 as basic trainer for their pilots.

In the ’70s and ’80s, italian flagship airline Alitalia owned a large fleet of SF.260 that were used as both basic and advanced trainers. The entire fleet was then sold to private owners during the late ’80s and the ’90s. Some of Alitalia’s SF.260 featured custom cockpits, equipped with airliners flight instruments - such those from the McDonnell Douglas MD-80, in force on Alitalia’s main routes.

In addition, there have been limited civil sales to private operators mainly in Europe. During the late 1960s, the type was marketed in the United States under the name Waco Meteor.

Armed military versions, sold as the SF.260W Warrior, proved to be popular with smaller air forces, which could arm the type for use in the close air support role. The main issue with the SF.260W used to be weight. This was the major cause of SF.260W shot-downs as heavy weight made the plane slow and less agile.

Both piston-powered and turboprop-powered models have been developed.

FEATURES LIST

Choose your plane version

- Civillian version powered by Lycoming O-540-E4A5
- Military version powered by Lycominb IO-540-E4A5
- Analog cockpit version
- G1000 cockpit version

Code driven flight dynamics

- Super fun to fly, requires your attention all the time
- Realistic takeoff, landing, cruise, and overall performance
- Realistic aerobatics
- Realistic stall behavior (watch your ailerons!)
- Impressive spin behavior
- Realistic roll speed at both high and low speeds

Outstandig 3D model and liveries

- Very light on FPS
- High performance 4K texture
- 10 Liveries included
- Blank textures with PSD available to create your own livery
- Tire blowout is shown
- Propeller blades bend on belly landing
- 3D modelled engine components
- Custom rain and ice effects

Realistic onboard systems and procedures

- Pre/Post flight walkaround
- Custom hand towing mode: use your joystick to push/pull/steer the aircraft on ground
- Realistic Mass and Balance
- Complete electrical system with working Circuit Breakers
- Custom landing gear warning system
- Custom stall warning system
- Custom vacuum system
- Custom flaps system with realistic “white-arc” behavior
- Custom fuel system
- Custom cabin ventilation and windshield defrost system
- Working Emergency Avionics switch with Emergency Battery
- Working emergency landing gear extraction procedure
- Canopy can stay slightly open during flight

Custom Damage & Maintenance System

- Any system can be damaged if used the wrong way
- Persisten aircraft state: each livery has its own state that is saved between flights. Damage is cumulative.
- Maintenance Report available to check the status of the aircraft and do the maintenance and repairs

Custom Economic System

- Can be enabled or disabled on the fly
- Pay for the maintenance
- Get rewarded for your flight time and good landings
- Compatible with FSEconomy

100% Custom Piston Engine

- The Lycoming I/O-540-E4A5 is modelled down to the smallest bolt and breathes air like a real engine
- Custom fuel pump and fuel filter
- Realistic Oil System affected by Oil Viscosity. Choose the best oil grade for your kind of operation.
- Spark plugs fouling. Change the spark plugs type in the maintenance report.
- Working engine preheater
- A custom algorithm simulates the fuel/air mixture and its combustion
- Custom carburetor system with custom icing behavior
- High fidelity power curve
- Custom system failures
- Realistic startup behavior and procedures
- Automatic startup option for quick start

High fidelity cockpit

- Right and left seat layouts
- All switches work like the real ones
- The cockpit is illuminated by 3D lights
- The instruments wear out and may give incorrect reading. Tap over them to temporarily try to reduce their error. Fix them in the - maintenance report.
- The cockpit light and indicators bulbs may start blinking and fail. Tap over them to temporarily try to light them up again. Replace - them in the maintenance report.
- Realistic phosphorous lights that dim at night as time passes by
- Working Circuit Breakers that you can use to shed the battery load in case of generator failure
- Ability to switch between different avionics layout
- Support for RealityXP GNS and GTN650
- Bendix/King KX165 NavCom
  - Realistic startup animations
  - Active/Standby frequencies mode
  - Active only mode
  - Program mode
  - Channels mode
  - CDI mode
  - Bearing mode
  - Radial mode
  - Timer mode
- Bendix/King KR87 ADF Receiver
  - Realistic startup animations
  - ANT/BFO/ADF modes
  - FLT/ET mode with SET/RST button

- Bendix/King KFC225 Autopilot
  - Realistic Startup Animations
  - ROLL and PITCH mode
  - HDG/NAV/VS/ALT modes
  - Yaw Damper
- Garmin GTX330 Transponder
  - Realistic Startup Animations
  - Altitude Monitor mode
  - Count down mode
  - Count up mode
  - Flight Time mode
  - OAT/DALT mode
  - PA mode

HeadShake Integration

- Use a custom lever in the cockpit to strengthen the belts and reduce the G-Force effects during aerobatic flight

Custom three dimensional sounds

- Custom sound engine that ensure high performance and quality
- Dynamic immersive sounds in both internal and external views
- Sounds are muffled by closing the canopy and wearing the headsets
- The canopy can stay slightly open during flight to let some fresh air in: you will feel the wind blowing on your face
- Enjoy the engine sound suffering the torque effects during aerobatic flight

Automatic Updates

- The airplane is constantly improved
- Issues are quickly fixed

INSTALLATION & CONFIGURATION

System requirements

This software requires X-Plane 11.00 or superior.

The minimum hardware requirements are the same of X-Plane:

- Dual Core, 2.5 GHz or faster
- 2 GB of RAM
- A video card with at least 500 MB of VRAM.

This software is designed to run on Windows, MacOS and Linux.

Linux

If you use REP on Linux, there are some addictional requirements:

- libstdc++6
- libgcc6
- libcurl
- libssl
- libcrypto

On Steam: Right-click on X-Plane 12, select Properties, navigate to Compatibility, check the box for “Force the use of a specific Steam compatibility tool,” and choose “Steam Linux Runtime 3.0 Sniper” or “Legacy Runtime 1.0” from the dropdown menu.

Install the software

The Reality Expansion Pack (REP) comes pre-installed with the SF.260D, eliminating the need for additional setup. To get started, simply copy the aircraft folder into the “Aircraft” directory within your X-Plane installation.

Next, launch X-Plane, load the aircraft, and follow any on-screen instructions. If no prompts appear, manually activate REP by navigating to **Plugins** → **SimCoders - REP** → **Enable Package** in the X-Plane menu.

Automatic Update of the Software

The Reality Expansion Pack support the automatic updates via the SkunkCrafts Updater plugin.

To enable automatic updates, you need to install the SkunkCrafts Updater plugin as outlined in its user manual. Once installed, the plugin will automatically handle updates each time you launch X-Plane.

For detailed instructions on how to install and use the SkunkCrafts Updater, please refer to this FAQ: How do I update my REP using the SkunkCrafts Updater plugin?

NOTE

Load a non-REP airplane - such as the default Cessna 172 - before applying the automatic updates. Applying the updates on the aircraft that is currently loaded in the sim will not guarantee a successful update.

NOTE

After updating the plane, close and relaunch X-Plane to make sure that all the files are unloaded and updated correctly.

Recommended sound settings

To better enjoy the Reality Expansion Pack on the SF.260D, you should setup your sound settings like the following screenshot.

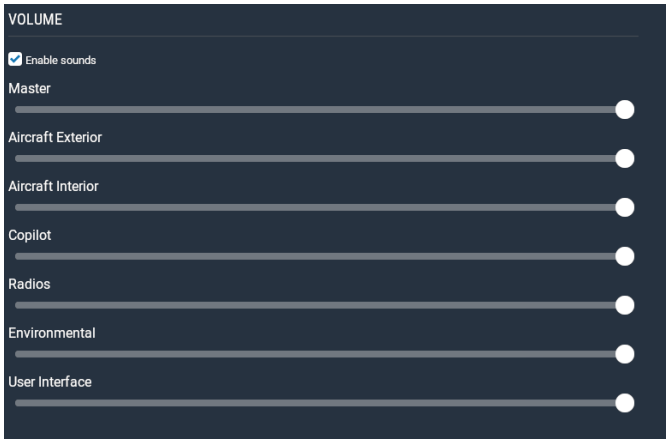

Figure 1: Recommended sound settings

For more information about the sounds, see the Sounds System chapter.

Recommended control settings

To have a better control over the airplane axis, you should setup your control sensitivity as follows.

Figure 2: Recommended control settings

HARDWARE & SOFTWARE COMPATIBILITY

Headshake

If HeadShake v1.5 or higher is installed in your system, it will communicate with REP to improve the simulation realism.

REP will drive HeadShake to simulate the vibrations of the real engine. Using this, you will be able to run the engine at the most comfortable RPMs by simply checking the vibrations it produces.

In the same way, HeadShake will simulate the stall buffeting if the airplane in use shows that kind of behavior.

Moreover, if Headshake v1.11 or higher is installed, you can set the seat belts strength using the lever near your seat. Push the lever forward to strengthen the seat belts.

Strengthening the belts will reduce the head movements during aerobatic flight.

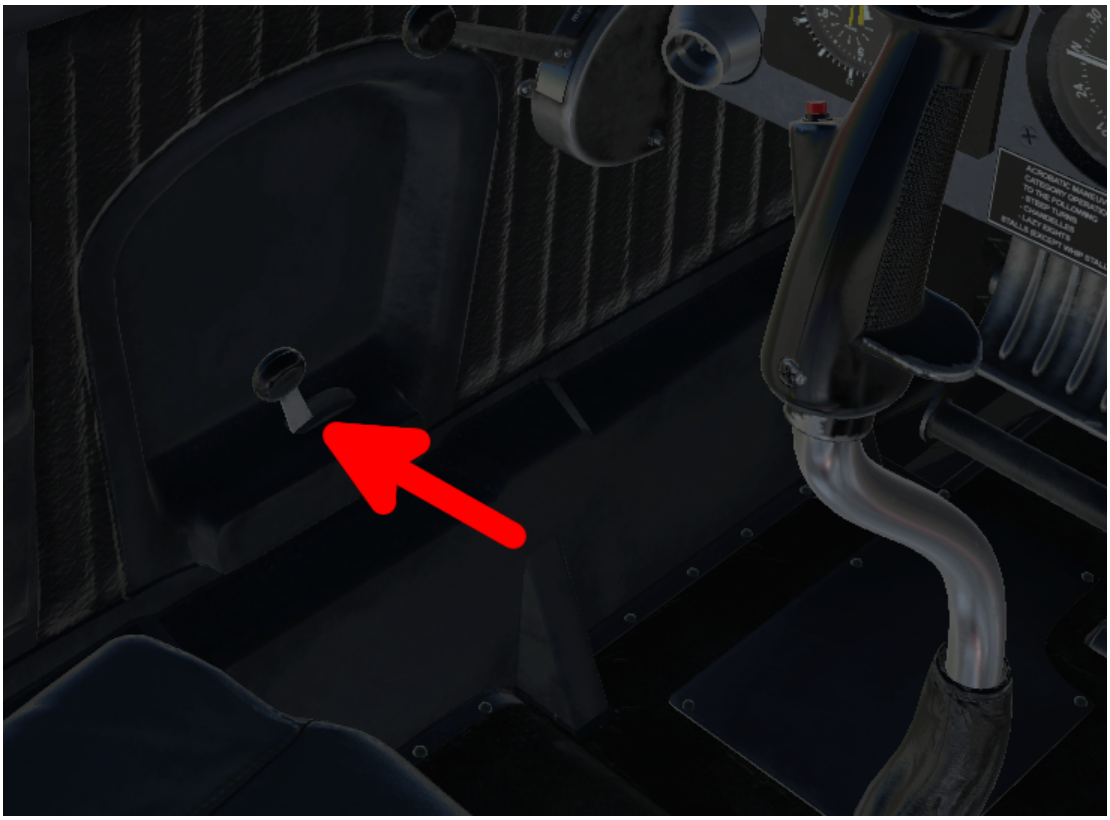

Figure 3: The lever pointed by the arrow controls the seat belts strength

Saitek Panels

This software is compatible with Saitek Panels. In order to use them, you should install the XSaitekPanels free plugin from Sparker.

This package already includes a INI configuration file for XSaitekPanels. Make sure you copy it inside the main folder of your SF.260D.

XPRealistic

The Reality Expansion Pack can be used together with XPRealistic.

You might need to disable XPRealistic's wind, touchdown and brakes sound effects as REP already provides them.

Differential and progressive brakes for X-Plane 11

The Reality Expansion Pack detects if Differential and progressive brakes for X-Plane 11 is installed in your system.

If so, REP's differential braking algorithm is disabled in favor of the custom differential brakes algorithm of the third party plugin.

USER INTERFACE

Lateral Menu

When loaded, REP shows a lateral menu on the left-side of the screen. The menu consists of a set of small icons.

By default, the menu partially hides itself until the mouse pointer gets near it.

Figure 4: The menu is partially hidden by default

Figure 5: The menu is shown when the mouse pointer gets closer to it

You can choose to completely hide the menu when the mouse pointer leaves it. To do so, go to “Plugins -> SimCoders - REP -> Settings” menu and tick the “Show side menu on mouse over only” option.

The lateral menu entries are available in the “Plugins -> SimCoders - REP” menu as well.

Maintenance Report

This window is the primary way you have to check the status of your airplane and to fix all the systems that need the mechanic attention.

The report is divided on more pages. Each page relates to a different group of systems.

To act on a system, click on the entry in the “Action” column.

To switch to the previous/next page click over the flipped page corners at the bottom of the report.

Figure 6: The Maintenance Report window

Kneeboard

The software come with a complete kneeboard window that contains the aircraft normal and emergency checklists together with the performance reference tables.

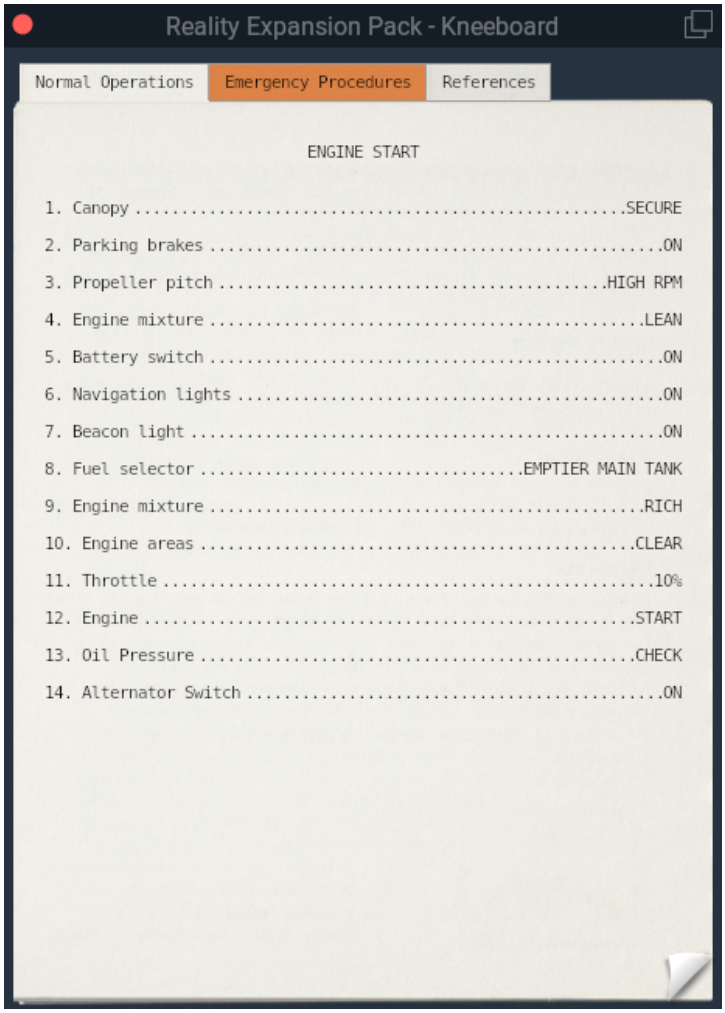

Figure 7: The Kneeboard window

Show the kneeboard using the plugins menu

The kneeboard window may be shown by clicking on the “Plugins” menu, then “SimCoders – REP” then “Show kneeboard”.

Manage the kneeboard using the custom commands

You can also use five different custom commands at which you can assign your custom keys or joystick buttons. The custom kneeboard commands defined by REP are the following:

Command	Description
simcoders/rep/kneeboard/toggle	Show or hide the kneeboard
simcoders/rep/kneeboard/next_section	Show the next kneeboard section
simcoders/rep/kneeboard/prev_section	Show the previous kneeboard section
simcoders/rep/kneeboard/next_page	Show the next kneeboard page
simcoders/rep/kneeboard/prev_page	Show the previous kneeboard page

Mass & Balance

The Reality Expansion Pack provides a Mass & Balance tool to precisely load the plane.

While loading the plane, the goal is to keep the crosses inside the plot section delimited by the blue area, like shown in the screenshot below.

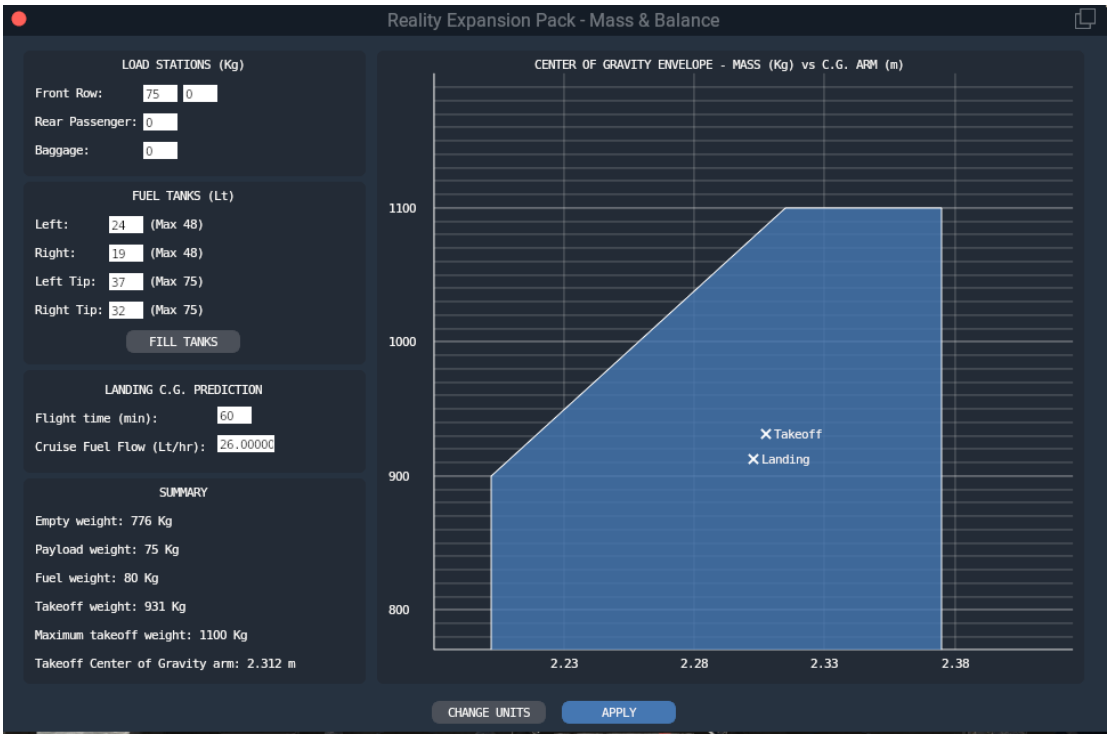

Figure 8: The Mass & Balance window

The blue area is the Center of Gravity Envelope. The mass is reported on the Y axis, the Center of Gravity Arm is reported on the X axis.

If the cross is towards the left side of the plot, it means that the center of gravity will be towards the front of the airplane, that is, the airplane will be nose heavy.

On the other hand, if the cross is on the right side of the plot, the airplane will be tail heavy.

If you overload the airplane and the cross goes outside the blue envelope, the cross becomes red, indicating that the plane is not allowed to fly.

Clicking on the “Apply” button, the selected passengers mass and fuel load will be applied to X-Plane.

The unit of measure for the airplane mass and the C.G. arm can be changed by clicking the “Change Units” button.

Walkaround

Click on the Walkaround icon in the lateral menu to enter walkaround mode. Click again on the same icon on close the walkaround window to return in the cockpit.

During walkaround you can interact with some external systems of the aircraft using the walkaround window. Click the “Next” and “Prev” buttons at the bottom of the pre-flight checklists to move along the different pre-flight stations.

Always do the walkaround and the pre-flight inspection before each flight.

If you do not remove the tie-down and the chocks, you are not able to taxi and takeoff properly.

If you do not remove the pitot cover, you will incur an airspeed indicator failure.

Since version 3.4.5, it is possible to toggle all the static elements - such as the pitot cover and the tiedowns - using a single entry in the plugins menu or a keyboard command.

Since version 3.3, the following keyboard/joystick commands are available to control the walkaround mode.

Command	Description
simcoders/rep/walkaround/toggle	Toggle the walkaround mode
simcoders/rep/walkaround/next	Next walkaround station
simcoders/rep/walkaround/previous	Previous walkaround station
simcoders/rep/walkaround/action	Execute current action
simcoders/rep/walkaround/static_elements/toggle	Static elements toggle

Move the viewpoint while doing the walkaround in 2D

It is possible to move the viewpoint during towing by using the default camera commands of X-Plane. To pan the view using the mouse, keep pressed the **simcoders/rep/view/pan_with_mouse** command.

Walkaround in VR

REP provides a series of hotspots around the airplane useful to check the plane during the pre-flight, post-flight and lights-check checklists.

Start the walkaround using the **simcoders/rep/walkaround/toggle** command and then move from station to station using your VR controller. Make sure you bring the walkaround window with you while moving from a station to another.

Towing

REP comes with a complete towing simulation. To activate it, click on the towing icon in the lateral menu. Click the icon again to exit from the towing mode.

The towing features a 3D towing bar that will help you driving the airplane on the tarmac.

To move the airplane, push or pull the pitch axis of your joystick. Use the roll axis to turn.

Since REP simulate the force applied by a single man placed in front of the airplane, you may not be able to tow the airplane on the grass, just like in real life.

You won't be able to tow the airplane if it's tied-down or if chocks/brakes are applied.

Move the viewpoint while towing in 2D

It is possible to move the viewpoint during towing by using the default camera commands of X-Plane. To pan the view using the mouse, keep pressed the **simcoders/rep/view/pan_with_mouse** command.

Towing in VR

REP provides an hotspot in front of the airplane (tricycle gear) or close to the tail (taildragger) useful to drive the airplane in VR mode.

Toggle the towing mode using the **simcoders/rep/towing/toggle** command and then move the airplane using your joystick as described above.

Engine Autostart

The Reality Expansion Pack provides you a way to automatically start the engines.

Click on the engine autostart icon in the side menu and wait until the startup procedure is completed.

During the automatic start, REP shows a series of tips that describe the action being done.

Settings Window

The settings windows is shown by clicking over the “Plugins -> SimCoders - REP -> Settings” menu.

Enable the plane damages

When ticked, this option enable the plane damages.

Show generic messages

If ticked, REP will show generic messages related to systems status, when available.

Show failure messages

If ticked, REP will show a message in case of a system failure. The message will explain why the failure happened and what course of action should be taken.

Show tip messages

If ticked, REP will show a tip message. The message will give some hints related to the current pilot actions.

Show side menu on mouse hover only

When ticked, REP will completely hide the lateral menu when the mouse pointer leaves it.

Save and restore the plane status between sessions

If ticked, REP will save the airplane status when unloaded. When the same plane and livery are loaded again, the status will be restored.

The status includes all the switches position, the fuel on-board, the loaded weights, the engine fluids quantity and quality and all the possible values that play part to the systems simulation.

The engine temperatures - such CHT and Oil Temperature - are restored accordingly to the elapsed time since the values where stored.

The status files are backed up before being overwritten. You find the backup in the output/preferences/REP folder.

Save and restore the windows position between sessions

If checked, the Maintenance Hangar and the Keyboard windows positions are saved and restored between sessions.

Enable hypoxia effect

When ticked, the default hypoxia effect is replaced by REP’s custom algorithm. See the Hypoxia chapter to get more information about the custom hypoxia effect.

Roll axis drives ground steering

When ticked, the joystick roll axis will steer the nosewheel on the ground.

Use US Customary

When ticked, REP will use the US Customary units of measure (pounds and inches).

Wind sound level

Control cabin the wind sound setting the level between 0 (mute) and 100 (full).

Main Monitor Index

This option is visible only if X-Plane is running on two or more fullscreen monitors. Type the index of the monitor over which REP must show its menus and windows. The minimum number you can set here is 1. The maximum number is your monitors count. Each number addresses a different monitor.

Pilot/Copilot altimeter use InHg

Enable this option to let the altimeters use InHg instead of hPa.

Use Advanced Steering

Enable this option to use REP's advanced steering algorithm. You may need to disable this option if you have issues with steering with your hardware pedals.

Use Advanced Braking

Enable this option to smooth the brakes and to enable the automatic differential brakes. Instead of applying the brakes all at once, they will go from 0 to 1 in two seconds, smoothing the braking action. Automatic differential braking is applied if brakes are pressed while steering. Disable this option if you use hardware toepedals.

Use VR Walkaround and Towing

When enabled, this option allows to use the new VR walkaround and towing modes.

Wait for real weather at startup

When this options is enabled together with the simulator real weather, REP waits for the real weather to be correctly loaded before loading the plane status and update the systems' temperatures. This option is not needed in X-Plane 12 therefore it is not shown.

In flight tips vertical offset

Set the vertical offset of the in-flight window. By default, the tips are shown at the top of the main screen.

LOW FUEL On if main tank empty

If checked, the LOW FUEL lamp (available in the military version only), turns on if the main tank contains less than 24lt. If unchecked, the lamp turn on if in total there are less than 34 liters available in all tanks.

HSI Compatibility Mode

Enable this option if your external hardware cannot set the HSI Course correctly. When active, the HSI uses X-Plane's default behavior. This helps make it compatible with some third-party hardware. If your HSI Course knob doesn't work as expected, try turning this on.

Economy System

The Reality Expansion Pack (REP) introduces a custom Economy System that rewards you for your flight time and allows you to manage maintenance and repair costs for your aircraft.

Modes of Operation

The Economy System offers three modes of operation:

- **Standalone**: Maintains a local bank account and maintenance records on your PC, shared among all your REP aircraft. Rewards are provided for flight time and landing skills.
- **FSEconomy**: Connects to your FSEconomy account, deducting maintenance costs directly from your FSEconomy balance. Flight time rewards are excluded, as they are handled by FSEconomy.
- **X-CPL-Pilot**: Integrates with your X-CPL-Pilot account to deduct maintenance costs. Flight rewards are not included, as they are managed by X-CPL-Pilot.

Enabling the Economy System

To activate the Economy System:

1. Open the Maintenance Report and navigate to the last page.
2. Click the “Enable” button for your chosen system.

FSEconomy: Aircraft Key Setup

If enabling the FSEconomy mode, an **Aircraft Key** is required. This key is a 15-character identifier unique to your aircraft within the FSEconomy environment.

Steps to find your Aircraft Key:

1. Log in to the FSEconomy website.
2. Select the “**Aircraft**” button from the main menu.
3. Locate your aircraft in the list and click “**Edit**” under the “Action” column.
4. Generate or copy the Aircraft Key from the lower-left corner of the page.

When enabled, the Economy System saves your aircraft state to a separate file. This allows for two independent aircraft states—one for when the Economy System is active and another for when it is disabled. Switching between modes will load the corresponding state.

Your bank account is shared across all REP aircraft, enabling you to use funds earned with one aircraft to repair or maintain another.

How It Works

Once activated, the Economy System displays your bank account balance and transaction history (expenses for maintenance and fuel, and income from flights) in the Maintenance Report.

Figure 9: Enable the Economy System

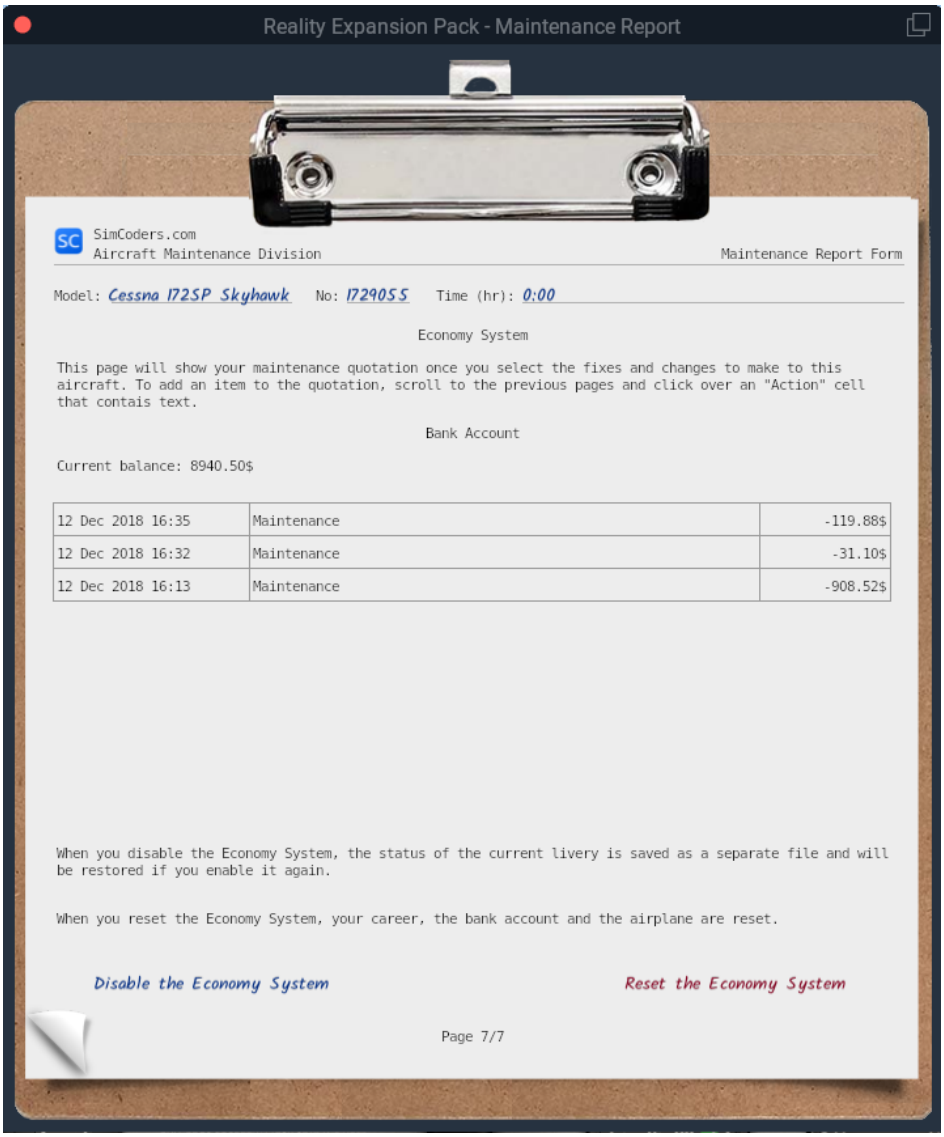

Figure 10: Economy System Overview

Maintenance and Repairs

1. Navigate to the Maintenance Report to view available maintenance tasks.
2. For each task, the table lists the cost and required work time.

Figure 11: Maintenance Report Example

3. Add tasks to your **Quotation** by clicking the “Action” cell for each item. The cell will update to show “In Quote”.
4. To remove a task, click the “Action” cell again.

Once you’ve selected the necessary actions, view your Quotation by clicking “View Quotation” or

scrolling to the last page of the Maintenance Report.

Figure 12: Quotation Example

The Quotation provides two pricing options:

- **Normal Price**: Maintenance is completed **one task at a time** in real-time, even if multiple aircraft require attention. The mechanic will continue working even if the simulator is closed.
- **Quick Fix Price**: All tasks are completed instantly at a higher cost.

Accept a price to proceed with maintenance, or decline to cancel the Quotation.

Buying and Selling Fuel

Standalone Mode Only

In the Weight and Balance window, you can add or remove fuel:

- **Adding Fuel**: Deducts money from your account based on local prices.
- **Removing Fuel**: Sells fuel back to the airport at a slightly lower rate than the purchase price.

Fuel prices vary by region, airport, and time, but can be customized via the `fuel_prices.cfg` file in the `Output/preferences/REP` directory of X-Plane. Note that custom prices are only applied after the next scheduled recalculation (every 4–8 days).

To check fuel prices at a specific airport, use the plugin menu: `SimCoders - REP` -> `Check fuel price at an airport`.

Earning Money: Rewards

Standalone Mode Only

Earn money for flight time, with bonus rewards for smooth landings. The softer the landing, the higher the bonus. Flight earnings are logged in your bank account transaction history at the end of each flight.

VR Support

REP supports the native VR implementation since version 3.4.0. VR support was further improved in version 4.5.0.

How to open the plugin windows in VR

REP provides a set of commands to control the plugin windows.

- **simcoders/rep/vr/open_menu**: open REP's main menu
- **simcoders/rep/fuelmenu/show**: show the fuel menu when using the economy system
- **simcoders/rep/maintenancereport/show**: show the maintenance report
- **simcoders/rep/settingsmenu/show**: show the settings menu
- **simcoders/rep/weightandbalance/show**: show the weight and balance (if supported)
- **simcoders/rep/towing/toggle**: toggle the tow mode
- **simcoders/rep/kneeboard/toggle**: toggle the kneeboard
- **simcoders/rep/walkaround/toggle**: toggle the walkaround mode

For more information about how to assign the commands above please read X-Plane's user guide about assigning commands to buttons.

NOTE

Make sure you loaded a REP airplane before looking for the command in X-Plane's settings window.

Figure 13: The Tech Report shown in VR mode

SOUNDS SYSTEM

The Reality Expansion Pack features a custom sound system that provides immersive 3D sounds throughout the entire flight experience.

A custom sounds system has been preferred over the usage of FMOD for the following reasons:

- FMOD could be rather cumbersome from the developer's point of view, requiring more time to produce new features
- A custom engine is more flexible and can be expanded in no time providing new features
- A custom engine is more efficient as it's taylored to our needs

REP's sounds system provides advanced sounds such:

- Engine ignition
- Engine pings
- Engine exhaust effects
- Fuel pumps
- Electric Gyros
- Avionics effects
- Dynamic touch down
- Dynamic ground roll
- Dynamic wind

Canopy and Headsets Muffling

Opening and closing the canopy muffle the external sounds, acting differently over the sounds spectrum.

It is possible to wear a headset to muffle the sounds eve more. You find the headsets in between the front seats. Click over them to wear them. Click over their connection cable to remove them.

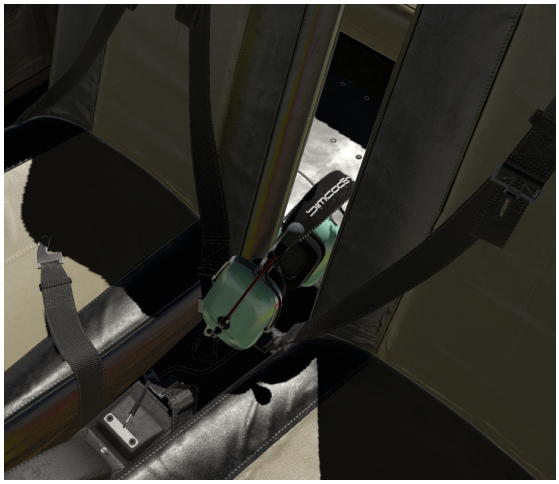

Figure 14: Headsets Location in the Cockpit

PERSISTENT AIRCRAFT AND COMPONENTS WEARING

Reality Expansion Pack – Wear & Tear System

The **Reality Expansion Pack** features a comprehensive **wear and tear system** that applies to the **entire aircraft**. Every component experiences wear over time, and after extended use, it may develop issues or even fail completely. The condition of each part is continuously saved and updated, even when the simulator is not running.

This applies to various aircraft systems, including engine components, the electrical system, airframe, landing gear, and even **flight instrumentation**.

Each component is affected by both **time and user handling** in different ways.

For example, if you push the engine beyond its operational limits, it will degrade faster, leading to startup difficulties, combustion irregularities, and a noticeable loss of power. If neglected, it will eventually fail.

The precision of cockpit instruments also diminishes over time—a **newly calibrated gauge** will be far more accurate than one that has been in service for years.

You can tap on an indicator or a bulb light to attempt a quick fix or correct small errors while in the cockpit.

Loading a Worn-Out Aircraft

With REP, you have the option to start with an aircraft that already has a **wear history**.

To do so, navigate to:
Plugins → **SimCoders.com - REP** → **Wear out to >**
and select one of the following presets:

- **Brand New**: A factory-fresh aircraft, just off the production line. The engine and all onboard systems are in perfect condition.
- **Privately Owned (New)**: A well-maintained aircraft with low flight hours. Some usage is logged, but no issues are present.
- **Privately Owned (Old)**: A privately owned aircraft with significant flight hours. While well cared for, wear is visible on various components.
- **Flying Club**: A well-used aircraft that has passed through many hands—some careful, others less so. Expect worn-out systems and degraded instrument performance.

Checking Component Status

To inspect, repair, or calibrate individual components, refer to the **Maintenance Report**.

This report provides a **detailed overview** of all aircraft components that can be checked and serviced by a mechanic.

Hobbs Time and Tach Time

Within the **Maintenance Report**, you will also find:

- **Hobbs Time** – The total airframe time.
- **Tach Time** – The total engine time.

After flying a new aircraft for a while, you may notice a **slight difference** between these two values due to how they are calculated.

Hobbs Time

In most aircraft, the **Hobbs meter** is triggered by an oil pressure switch, meaning it starts counting when the engine is running and stops when the engine shuts down.

It measures time in **real-world clock intervals**, ticking off **0.1 hours** every **6 minutes**, regardless of whether the aircraft is idling or in cruise flight.

Tach Time

Unlike Hobbs time, the **tachometer clock** does not track actual time; instead, it records **engine revolutions**.

- When the engine runs at **cruise RPM**, the tachometer records time at the same rate as the Hobbs meter.
- If the engine operates at a lower RPM (e.g., idling on the ramp), the tach time accumulates **more slowly** than Hobbs time.
- This means that **the faster you run the engine, the faster the tach time increases**.

By understanding and managing wear and tear, you can extend the life of your aircraft's components and maintain peak performance throughout your flights.

FLIGHT CHARACTERISTICS

General Flight Characteristics

The gencral flight characteristics give this aircraft complete and safe aerobatic capabilities.

Flight Controls

The flight controls, of conventional type, require limited forces to move the control surfaces which are effective in all configurations.

Takeoff

During takeoff the propeller produces a strong yaw moment. Slowly apply full power during the takeoff run, counteracting the yaw using the rudder.

Level Flight Characteristics

Low Speeds

The low speed characteristics and maneuverability of the aircraft are good. The flight controls arc always effective near stall conditions.

Extension or retraction of the wing flaps and the landing gear causes only a slight trim change.

In the white-arc range, especially with flaps down, the aircraft has a great roll authority. Low stick movements are sufficient to cause a high roll speed. If pilot overcorrections may easily end up in Pilot Induced Oscillations (PIO) around the logitudinal axis.

Cruise and High Speed

The aircraft has good maneuver margin characteristics all over the speed range. The stability is good around all the axes.

Stalls

Anticipated Stall Warning

The natural stall warning is perceived only a few knots above the minimum lifting speed. A stall warning system is provided on the aircraft to give the pilot an indication of an impeding stall.

The stall warning system operates at approximately 5 to 10 Kts above stalling speed.

1g Stall

A Tight buffeting occurs in advance of the stall.

A control softening tendency occurs coincident with the buffeting. Lateral control is adequate during the stall and recovery. During the stall the aircraft is statically stable. As soon as the maximum lift coefficient has been exceeded, the aircraft has a tendency to lower the nose.

During the stall all controls remain effective. The stall recovery is easily accomplished by slightly moving the stick forward and, being the case, increasing power.

Accelerated Stall

As the stall is approached in a turn a control softening tendency occurs coincident with the onset of buffeting. At higher load factors buffeting increases indicating that the stall is imminent. The aircraft does not exhibit any tendency to drop a wing in accelerated stall unless the stall is combined with a side skid.

In this case the aircraft has a teadency to roll to the same side where the aircraft nose is skidding. The wing drop tendency produced by skid is easily contrasted by the rudder.

Aerobatic Maneuvers Entry Speeds

The suggested entry speeds with aircraft in clean configuration are the following:

- Chandelle: 150 KIAS
- Lazy Eight: 150 KIAS
- Steep Turn: 150 KIAS
- Loop: 175 KIAS
- Roll: 160 KIAS
- Immelman: 190 KIAS

LIMITATIONS

Minimum Crew

The minimum flight crew required for all operations is one pilot.

Engine Limitations

The engine is rated at a maximum power of 260HP at 2700RPM.

The engine may be operated continuosly under conditions not exceeding the parameters above but this power is normally only to be used when operationally essential.

WARNING

Aerobatic maneuvers are not permitted between 2200 and 2450 RPM.

Airspeed Limitations

Never Exceed Speed (Vne)

Never Exceed Speed (Vne) is 236 KIAS. This speed must not be exceeded otherwise overstressing of the aircraft may occur.

This speed is marked on the airspeed indicator with a red line.

Normal Operating Speed (Vno)

Normal Operating Speed (Vno) is 187 KIAS.

This speed is the maximum structural cruising speed.

This is the maximum allowed speed in severe turbulence.

Maximum Maneuvering Speed (Vp)

Maximum speed at which abrupt, full controls deflection will not exceed design limitations.

- Weight up to 1100 Kg (2425 Lbs): 174 KIAS

Landing Gear Limit Speed

Maximum speed for operation with the landing gear extended, extending or retracting is 108 KIAS.

Wing Flap Limit Speed

Maximum speed for wing flap extension to 20 degrees is 125 KIAS.

Maximum speed for full flaps extension to 50 degrees is 108 KIAS.

Limit speed-opening canopy in flight

For opening the canopy in flight, airspeed is limited to 120 KIAS.

Flight Maneuvering Limitations

- Inverted flight is permitted for less than 10 seconds.
- Intentional spins with fuel in the tip tanks are prohibited.
- Do not fly for more than 10 seconds the following attitudes:
  - Vertical flight, steep dive
  - Inverted flight steep dive
  - Zero G periods
  - Wing-down or knife-edge-flights
- When performing aerobatic maneuvers:
  - Rear seat must not be occupied
  - Shoulder harness must be connected
  - No baggage is allowed
  - Empty tip tanks (< 1/8 indication)

FUEL ON AIRCAFT	INVERTED FLIGHT	INTENTIONAL SPIN	ROLLING PULL-OUT	FLICK ROLL
Empty tip tanks	10 seconds	Allowed	+4.0 G	Allowed up to 125 KIAS
Full tip tanks	10 seconds	Prohibited	+3.7 G	Prohibited

Load Factor Limitations

- Max G's (fuel tip tanks empty): +6.0 to -3.0 Gs
- Max G's (fuel tip tanks full): +3.7 to -2.2 Gs
- Aerobatic maneuvers allowed:
  - Steep turns
  - Lazy Eight
  - Stalls
  - Aileron Roll
  - Loop
  - Immelmann
  - Spin
  - Chandelle
  - Vertical Turn
  - Cuban Eight

Wind Limitations

The maximum crosswind during take-off or landing is 25 kts.

The maximum crosswind during take-off or landing with one fuel tip tank empty and the other full is 8 kts.

SYSTEMS DESCRIPTION

Within the Reality Expansion Pack, each system has its own life-cycle and can be damanged depending on many factors, including the pilot's behavior.

All systems can be fixed individually using the Maintenance Report or all at once using the **simcoders/rep/systems/fix_all** command.

The following is a brief description of each system onboard.

Powerplant

The SF.260D is powered by a six-cylinders Lycoming O-540-E4A5 normally aspirated, direct-drive, air-cooled, horizontally-opposed, carburetor engine with 540 cubic inches displacement.

This engine outputs a maximum power of 260HP at 29 inHg of manifold absolute pressure and 2700RPM with no time limitations.

Engine Overview

The Reality Expansion Pack totally replaces the engine simulated by X-Plane with custom algorithms to the point that not a single bit of the old engine model is left in the sim.

Everything in the engine is made from scratch to provide the maximum realism. This includes the combustion model to which all the other models - such as the Power Output, the Cylinders Head Temperature or the Oil Pressure - depend.

The engine now breathes air, mix it with fuel and produce a realistic combustion.

Some of the features include:

- **Correct animations and sounds**: the cylinders compression is simulated to the deepest level, enhancing the propeller movements at very low RPMs and at startup and shutdown
- **Correct power output**: the engine outputs the correct power at every MAP/RPM setting.
- **Correct fuel flow**: reaching the correct power output allows X-Plane to provide the right fuel flow at every phase of the flight, right down to the numbers.
- **Realistic startup procedure**: The engine needs to be primed and prepared for startup following the correct procedure
- **Realistic engine issues**:
  - The oil type, quality and quantity affects the engine behavior.
  - The spark plugs may foul because of carbon deposits
  - Leaning the mixture at the wrong time or in the wrong way may cause damages to the engine
  - Carburetor dynamics and ice accretion
  - Engine preheater and winterization kit: the engine may be preheated in winter using the provided electric engine heater. If the engine is not heated correctly, it won't start or may be damaged after start.

Starter

The Reality Expansion Pack replaces the default starter with a custom one.

In the “Engine Status” page of the Maintenance Report you can:

- Check the starter status
- Replace a faulty starter with a new one

CAUTION

The starter will overheat and then damage if engaged for too long. Make sure to engage the starter for no more than 30 seconds. Let it cool down between failed starts.

Induction System

The Reality Expansion Pack (REP) implements a custom Manifold Absolute Pressure (MAP) algorithm, replacing X-Plane’s default system for enhanced accuracy and realism.

The SF.260D engine is normally aspirated. That is, the maximum air pressure that affects the engine is the outside atmospheric pressure.

During climb, as the atmospheric pressure gets lower the maximum manifold pressure gets lower as well.

Fuel System

The aircraft is provided with 4 tanks.

- Two main tanks in the wings (13USG each)
- Two tip tanks (20USG each)

The way the tanks can/should be used depends on the fuel system configuration.

- **Civillian Version**

  The fuel flows from each tank to the fuel selector valve and then to the engine. The fuel selector placed on the throttle pedestal can be used to drive the fuel to the engine from:

  - The left main tank
  - The right main tank
  - The left tip tank
  - The right tip tank
  - Both the tip tanks at the same time

  Takeoff and landings are always accomplished on the fullest main tank.

  Electric Fuel Pump

  The Electric Fuel Pump provides enough fuel pressure to let the engine run in case of a mechanical fuel pump failure. The pump switch must be in the on position during startup, takeoff, landing and fuel tank selection change.

  The electric fuel pump shall be ON whenever the fuel tank selector is turned to change the currently selected fuel tank.

- **Military Version**

  In this version there is no fuel selector available.

  The fuel flows from the left main tank (feeder) to the engine. An jet pump - powered by the engine motive flow - transfers the fuel from the right main tank to the left main tank. When the **Tip Fuel Transfer** switch is on, fuel is transferred from both tip tanks to the left main tank. In this case, the right main to left main tank fuel transfer is not active.

  Engine Fuel Pumps

  The engine is provided with a mechanical fuel pump. However, there are two more electric fuel pumps (Main and Aux) that work as backup for the main mechanical pump and provide positive fuel pressure from the fuel tanks to the fuel line.

  Main and Aux pumps are controlled by the **tri-state fuel pump switch** and by the **Aux Pump Reset Button**.

  When the fuel pump selector switch is first set to Main, the Main Fuel Pump is NOT energized, the Aux Fuel Pump comes online and the MAIN OFF warning light comes off.

  The Main Fuel Pump is then set online by pressing the Aux Pump Reset Button for 2 seconds. This allows the pilot to check that the Aux Fuel Pump comes online automatically in case of main fuel pump failure when the Fuel Pump Switch is set to Main.

  The Main Fuel Pump is then left on for the entire flight.

In case the fuel pump switch is set to Aux and there's an Aux Fuel Pump failure, the AUX OFF warning light comes off.

Fuel Tip Trans Pump

The Fuel Tip Trans pump is an electric pump that transfers the fuel from the tip tanks to the left main tank. If there's fuel in the tip tanks this pump can be left on throughout the flight.

If the fuel pump is not energized despite the Tip Trans switch being on, or there's less than 3lt of fuel in the tip tanks and the Tip Trans switch is on, the "NO TIP TRANS" warning light comes off.

Warning Lights

- FUEL PRESS: the fuel pressure is lower than 14PSI
- FUEL LOW: the total fuel quantity is lowe than 25lt (6.6USG)
- MAIN OFF: the main electric fuel pump is off despite the pump switch being in the Main position (main pump failure or pump reset switch needed to be pressed for 2 seconds)
- AUX OFF: the aux electric fuel pump is off despite the pump switch being in the Aux position (aux pump failure)
- NO TIP TRANS: the fuel is not transfered from the tip tanks to the main left tank despite the Tip Trans switch being on the On position (fuel transfer pump failure or no fuel in the tanks)

Fuel Injection System

This chapter only applies to the Military version of the SF.260 equipped with the Lycoming IO-540-E4A5 engine.

The Reality Expansion Pack fully recreates the Bendix RSA Precision Flow Fuel Injection System that powers the real world SF.260D.

This fuel injection system is provided with a Venturi that senses the amount of air that goes to the engine and so regulates the fuel flow accordingly.

With altitude, the air density reduces more than the fuel density. So this metering system still requires the pilot to lean the mixture at high-density altitude.

Tuned Fuel Injectors

The cylinders and air induction positions lead to a different amount of air being sucked in each cylinder for a given throttle position.

That is, more air goes into the #1 and #2 cylinders than in #3 and #4. In a 6 cylinders engine, the spread between #1 and #6 is quite wide.

Factory fuel injectors deliver the same amount of fuel to each cylinder. That is, cylinder #1 runs leaner than #2. The richer cylinder is usually #5 or #6.

This spread affects the engine performance, especially when running lean of peak with only one EGT probe. Usually, leaning LOP for the hottest cylinder (#5 or #6 in a 6 cylinders, #3 or #4 in a 4 cylinders) means being widely LOP for the #1 cylinder, thus experiencing a loss of power together with a rough running engine.

In the Maintenance Report, it is possible to replace the factory injectors with tuned ones, made to properly release the correct amount of fuel based on the cylinder number. Tuned injectors allow for:

- Smoother LOP operations
- Fewer vibrations
- **Lower fuel burn of about 1 GPH**

General Aviation Modifications, Inc. is a real world manufacturer of tuned fuel injectors for many different type of fuel injected engines. For more information, please visit GAMI's website.

Carburetor

This chapter only applies to the civilian SF.260 powered by the Lycoming O-540-E4A5 engine.

The Reality Expansion Pack simulates the carburetor dynamics and the carburetor ice accretion.

Carburetor Icing, or carb icing, is an icing condition which can affect any carburetor under certain atmospheric conditions.

Carburetor icing occurs when there is humid air - such during hot summer days or rainy winter days - and the temperature drop in the Venturi causes the water vapor to freeze.

The Venturi effect can drop the ambient air temperature by 30-40 degrees F (16.7-22.2 degrees C), therefore carburetor icing often occurs when the outside air temperature is in the 60-70 degree F (15.6-21.1 degree C) range.

Unfortunately, **the warm air temperature often causes pilots of aircraft to overlook the possibility of carb icing**. The ice will form on the surfaces of the carburetor throat, further restricting it. This may increase the Venturi effect initially, but eventually restricts airflow, perhaps even causing a complete blockage of air to the carburetor.

To prevent carb icing, a carburetor heating system drives hot, unfiltered air from the engine directly into the engine air intake. Pull the yellow carburetor heat knob to activate the carburetor heat.

Figure 15: Left: the carburetor heat knob is labelled CARB HEAT. Right: carburetor temp gauge

On many aircrafts, the carburetor heat knob can only be fully pulled or fully pushed. When a carburetor temperature gauge is available, however, the knob can be partially pulled just enough to exclude any ice danger.

The carburetor temperature gauge shows a yellow arc that defines the range of carburetor air temperature that most causes carburetor ice. Pull the carburetor heat knob to keep the gauge needle above or below the yellow arc whenever you suspect that carb icing conditions are met.

Detect carburetor Icing

Symptoms of carburetor icing include:

- **Quick MAP decrease**: the air intake area is reduced by ice accretion thus reducing the amount of air sucked in by the engine.
- **Engine stutters**: when the ice accretion is large enough, ice is ingested by the engine preventing proper fuel combustion.

Whenever ice accretion is suspected, the carburetor heat knob must be fully pulled.

WARNING

When carburetor ice is taking place, pulling the heat knob may temporarily increase the perceived engine stutters and loss of power. That is, the engine ingests melted ice and stutters more than before.

Do not disable the carburetor heat. After a few seconds the ice will clear and the engine will run normally.

Spark Plugs

Each cylinder is provided with two spark plugs, one connected to the left magneto and the other connected to the right magneto.

Carbon deposits form on the spark plugs pointers if the engine is run at low RPMs with rich mixture. That is, the spark plugs foul.

To avoid fouling, always keep at least 1000RPM and aggressively lean the mixture when on ground.

A big drop in RPM during the magnetos check is a sign of a fouled spark plug.

To clean the spark plugs, set a high power setting and aggressively lean the mixture. Run the engine with this setting for about 20 seconds then recheck the magnetos.

In the “Engine Status” page of the Maintenance Report you can:

- Check the spark plugs status
- Manually clean the spark plugs
- Change the default spark plugs with the “fine wire” type.

Fine wire spark plugs are less prone to fouling but not immune to it.

Exhaust System

The main goal of the Exhaust System is to emptying each cylinder of spent exhaust gases.

Factory exhaust usually aren’t length-tuned. That is, the length from the cylinder’s outlet valve to the end of the exhaust is not the same for each exhaust tube. This causes the formation of shock waves when the exhaust gases from one cylinder hit those from another cylinder. That is, the emptying effect is lower than desired.

Using the Maintenance Report it is possible to replace the factory exhaust with tuned ones. Tuned exhaust allow for:

- ~10% more power
- Fewer vibrations
- Lower fuel burn
- Lower CHTs

Oil System

The oil system has the main role to lubricate the engine thus reducing the friction between engine components. It also helps reduce the engine temperature.

The oil system is made by:

- An **oil tank**
- A **screening filter**
- A set of **oil lines** that go to the cylinders
- An engine-driven **scavenging pump** that moves the oil from the bottom of the oil sump - below the engine - back to the oil tank
- An **oil radiator**.

The Reality Expansion Pack simulates all these components as well as the oil fluid properties.

The pilot must check the quantity and quality of the oil before each flight. This should be done during the walkaround.

In the “Engine Status” page of the Maintenance Report you can:

- Check the **type of oil fluid** in use
- Check the **quantity of oil fluid** in the oil tank
- **Change the oil** fluid type
- Check the **status of the oil filter**
- **Change the oil filter** with a new one
- Check the **oil pump status**
- Overhaul the **oil pump**

A higher grade oil - such SAE50 - is thicker than a lower grade - such SAE30 - and meant to be used in hotter climates.

The following article is a guide to choose the correct oil grade depending on the type of flight operations in progress: https://www.simcoders.com/2016/04/18/how-to-choose-right-oil-engine

If the oil is not changed regularly (about every 40 hours) it may get dirty and have a lower lubricant action. That is, the engine will run hotter and wear more than before.

NOTE

The oil pressure may get closer to its maximum value when a cold engine is first started. This is normal and do not cause any harm to the engine as long as the oil pressure gets lower during engine warmup.

Warmup the engine to ensure the correct oil temperature and pressure before applying full power for takeoff.

CAUTION

Using a higher grade oil in cold climates could lead to high oil pressure, thus damaging the oil system components.

Propeller

The Reality Expansion Pack replaces the default propeller governor with a custom one.

The propeller governor controls the propeller blades pitch in order to maintain a constant propeller speed.

The governor drives the blades pitch using the engine oil pressure. Make sure to properly warm up the engine before takeoff to ensure a faster response of the governor.

During the engine run up, three prop governor cycles will ensure a better oil recirculation inside the propeller governor oil circuit.

The Red Box

When the big bore engines like the IO-550, IO-540 and the IO-520 were designed, there were many misconceptions about how to actually manage the engine throughout the normal operating range.

The most common tip was to run 100°F ROP during high power operations, such climb, and 50°ROP during cruise, with the extra rule to almost never run LOP.

When engine monitors started to be normal equipment on most high-end GA aircrafts, pilots finally had some data on which they could base they engine management decisions.

It turned out that the 50/100°ROP rule is – generally speaking – not the best way to take care of your engine.

In fact, the best ranges turned out to be the following:

- Above 80% of power: richer than 200°F ROP or leaner than 60°F LOP
- Between 75% and 80% of power: richer than 180°F ROP or leaner than 40°F LOP
- Between 70% and 75% of power: richer than 125°F ROP or leaner than 25°F LOP
- Between 65% and 70% of power: richer than 100°F ROP or leaner than peak EGT
- Below 65% of power: no restrictions, lean as you like

The ranges outside the one suggested above form what is called the ‘red box’.

Running the engine in the red box is not really damaging it, but if you take care of it and stay away from the red box, you may extend the engine life and get an engine that run smoother.

An extensive explanation of how and why you should keep the red box rule in mind is in this article: https://www.avweb.com/news/savvyaviator/savvy_aviator_59_egt_cht_and_leaning-198162-1.html

Engine Monitor

The Reality Expansion Pack provides an engine monitor that shows the engine parameters such as the Fuel Flow, the EGT and the BHP whenever the engine control levers are moved.

To activate the engine monitor, open the plugin settings and check the “Show Engine Monitor” option.

Preheater

To engage the engine preheater, open the Maintenance Report window and activate the electrical heater by going into the “Engine Tools” section.

The electrical heater will warm up the engine (CHT) and the oil to a temperature that is suitable for startup is 30/60 minutes, depending on the outside air temperature.

A “Fast Warmup” button is available in the Maintenance Report window. Once clicked, the engine will be warmed up instantly.

Keeping the cowl plugs mounted will provide a faster and better warmup. To mount the cowl plugs, enter the walkaround mode and move to the engine checks.

If operating in very cold climates, keep the engine preheater on until the walkaround is completed and startup the engine as soon as the preheater is turned off.

The engine preheater state is kept between X-Plane sessions. If you turn on the heater and then close X-Plane, the engine will be warmed up even when the simulator is not running.

Engine Startup Tips

- If the engine is cold (civilian version only), crank the throttle two or three times before engaging the starter.
- If the engine is warm already, no priming is needed before cranking the starter.
- If the engine “pops” during the startup it means it’s flooded. Just close the mixture and set the throttle full open, then engage the starter. The engine should start in a few revolutions. If not, repeat the normal startup procedure.

Vacuum System

The engine is provided with a vacuum pump used to power up the vacuum gyros.

A vacuum pump is connected to the engine via a quick-break shaft. In case of vacuum pump seizure, the shaft breaks and no harm is done to the engine.

Use the vacuum gauge to check that the vacuum pump is properly working. A normal vacuum reading is about 4 to 6 when the engine is running at cruise power.

In the “Engine Status” page of the Maintenance Report you can:

- Check the vacuum pump status
- Repair a broken vacuum pump

Mass and Balance Figures

These are the figures you can use to calculate the mass and balance on your own instead of using the Mass and Balance Window.

Station	Mass (Kg)	Arm (m)
Empty Mass	776	2.268
Front Row		2.55
Rear Pax		3.3
Bagagge		3.8
Main Tanks		2.68
Tip Tanks		2.42

Electrical Systems & Avionics

The airplane is equipped with a 28-volt, direct-current electrical system.

The system uses a battery as the source of electrical energy. An 60-amp alternator maintains its state of charge.

Battery

The default battery is replaced with a battery that keeps its charge between sim sessions and discharges at a realistic rate. The battery state is updated even when the simulator is not running. This means that if you leave your battery on, it will discharge even if X-Plane is closed.

In the “Electrical System & Avionics Status” page of the Maintenance Report you can:

- Check the battery **charge**
- **Recharge** the battery
- **Disconnect** the battery poles from the electrical system

If you plan not to fly the airplane for a while, you should disconnect the battery via the Maintenance Window. This will avoid self-discharging and extend the battery life during storage.

Emergency Battery/Avionics

This aircraft features an Emergency Battery made by 28 AA batteries. The Emergency Battery is connected to the ESS Bus by switching the “Emergency Avionics” switch to the on position.

The Emergency Battery will provide power to the avionics - whatever the position of the Avionics Master switch - and to the main cockpit lights for about 30 minutes.

CAUTION

The Emergency Battery is not charged by an alternator. Therefore, once discharged the battery must be recharged using the Maintenance Report Window. Use the Emergency Battery with care only in case of alternator failure after the main battery is totally discharged.

Functional Circuit Breakers

Figure 16: The set of Circuit Breakers found in the cockpit

In the **Reality Expansion Pack (REP)**, all **Circuit Breakers (CBs) are fully functional**, each controlling the specific system labeled next to it in the cockpit.

When a circuit breaker is **pulled out**, it **cuts off power** to the corresponding equipment or system, just as it would in a real aircraft. This allows for realistic **failure management and troubleshooting**, giving pilots the ability to simulate and respond to electrical issues during flight. Proper use of circuit breakers is essential for diagnosing malfunctions and preventing potential damage to onboard systems.

- RMI: RMI indicator.
- COM 1: GPS.
- COM 2: KX165A Com/Nav 2 radio.
- DME: Distance Measuring Equipment. When excluded, no DME data is provided to the AS399 HSI.
- ADF: KR87 ADF receiver power.
- ATC: GTX-330 Transponder.
- COMP: The HSI flux gate/compass. When excluded, the HSI is in free mode and no compass information is sent to it.
- ICS 1/2: Intercom System.
- A/P: KFC225 Autopilot.
- ALT 1/2: Altitude Encoding System.
- ENG INSTR: Engine Instruments.
- FLAPS: Flaps Motor.
- START: Engine Starter.
- WARN: Stall Warning Lights and Horn.
- INT LTS PNL: Interior Panel Lights.

- LDG IND: Landing Gear Indicator.
- LDG POWER: Landing Gear Motor.

Alternator

The alternator switch position is saved through all X-Plane sessions. Make sure it is switched in the correct position according to the checklists throughout the entire flight.

The alternator switch operation may affect the avionics. Check the Avionics paragraph below to get more information.

Lights

The light switch positions are saved through all X-Plane sessions.

If the airplane is not provided with strobe lights fmod sounds, the Reality Expansion Pack adds the strobe lights sounds when the lights are switched on.

Cockpit Lights Bulbs

Each cockpit instrument that features night illumination is provided with one or more light bulb. Every light bulb has its own lifespan and can go out after some time.

A bulb that is going to go out blinks for a while before failing completely.

It is possible to replace the light bulbs in the Maintenance Window.

Electrical Gyros

The Reality Expansion Pack replaces the default X-Plane electrical gyros with custom ones with a more realistic spin up/down dynamics.

The typical spin up/down sounds are reproduced when the battery switch is turned in the “On” position. The instruments provided with an electrical gyro and therefore depending on the electrical supply are the turn/slip indicator, the standby attitude indicator and the HSI, if they are provided.

Radio Stack

The radio components save their own state - such as frequencies and knobs position - during X-Plane sessions.

In the “Electrical System & Avionics Status” page of the Maintenance Report you can:

- Check the **status** of each radio
- **Fix** a faulty radio
- Switch avionics layout between Default Garmin GNS430, RealityXP GTN650/GTN750 and No-GPS.
- Switch between right seat and left seat layouts

CAUTION

Never turn on or off the engine or the alternator when the avionics switch is in the “On” position. Doing so may trigger a overvoltage spike that could damage one or more avionics components.

The newer avionics such as the Garmin GNS430/530 are better protected from overloads but they are not totally immune from them.

Bendix/King KX165A Com/Nav Radio

Figure 17: Bendix/King KX165A

REP model all the functions of the real KX165A. This Nav/Com radio features a complete set of functions such:

- Active only COM mode
- Active/Standby COM mode
- 32 storable COM channels
- Active only NAV mode
- Active/Standby NAV mode
- NAV Bearing mode
- NAV CDI mode
- Timer mode

To better understand the use of this radio, you should read the Bendix/King radio stack manual (click on resources tab).

Bendix/King KFC225 Autopilot

Figure 18: Bendix/King KFC225

This autopilot features all the functions of the real counterpart.

To better understand the use of this autopilot, you should read the Bendix/King manual.

Bendix King KR87 ADF Receiver

This ADF receiver features all the functions of the real counterpart such

- BFO/ADF/ANT modes
- Active frequency only mode
- Standby frequency mode
- FLT/ET mode

Figure 19: Bendix/King KR87

To better understand the use of this receiver, you should read the Bendix/King radio stack manual (click on resources tab).

Garmin GTX330 Transponder

Figure 20: Garmin GTX330

REP models all the functions of the GTX-330 transponder such:

- Pressure Altitude mode
- Flight Time mode
- Altitude Monitor mode
- OAT/DALT mode
- Count Up Timer mode
- Count Down Timer mode

To better understand the use of this transponder, you should read the Garmin manual.

Set a custom VFR Transponder Code

1. Keep the FUNC button pressed for 1 second or more to enter the Settings page
2. Press the CRSR button to highlight the current VFR Transponder Code
3. Using the digits buttons, insert the new VFR Code
4. To save the settings and exit the Settings page, turn the transponder off then on again

AS399 HSI

Figure 21: AS399 HSI

The AS399 shows the Course and DME data in two windows in the upper-left and upper-right corners.

The upper-left window always shows the selected course on the HSI.

The upper-right window can show the DME distance in NM or the DME time in minutes. To select the proper data, use the DME/TIME switch located nearby the light switches.

To switch the DME source between NAV1/NAV2 use the proper switch labelled NAV1/NAV2 near the master avionics switch.

HDG Flag

The red HDG Warning Flag becomes visible when the speed of the directional gyro is too low. The HDG Warning Flag also appears if the gyro has lost synchronization with the master (if a offset of more than 3 degrees is detected between earth magnetic field and the gyro indication). It also shows up, if the slaved gyro system is switch to manual mode.

NAV Flag

The red NAV Warning Flag indicates that the CDI indicator is unreliable. It is driven by the signal quality of the received nav station. Do not use the CDI indicator for navigation when the NAV Warning Flag is visible.

GS Flag

The red NAV Warning Flag indicates that the Glide Slope indicator is unreliable. It is driven by the signal quality of the received nav station. Do not use the GS indicator for navigation when the GS Warning Flag is visible.

Landing Gear

The airplane is equipped with a tricycle, hydraulically actuated, retractable landing gear. The landing gear requires approximately 7 seconds for extension or retraction.

The Reality Expansion Pack introduces the following changes to the default landing gear:

- **Improved ground roll physics**: REP corrects the default behavior of X-Plane on ground in cross wind conditions, when the airplane tended to steer against the wind.
- **Custom touchdown sounds**: The touchdown sounds tone and volume are related to the touchdown speed. A harder touchdown will produce different sounds than a soft landing.
- **Brakes sounds**: Actuating the brakes produces the typical whining sound. Also the classic squeaking sounds are reproduced when the brakes are not in perfect shape.

In the “Landing Gear & Brakes Status” page of the Maintenance Report you can:

- Check the **status** of the landing gear struts
- **Fix** a faulty strut

Landing Gear Indication Lights

Three green lights are shown in the cockpit if the landing gear is down and locked.

A red/orange light is shown in the cockpit if the landing gear is unlocked or in transition.

Each light can be tested by pressing it when the master battery switch is turned on.

Landing Gear Warning System

The gear warning system is triggered if landing gear is up and:

- A Manifold Pressure lower than 15inHg is selected or
- A flaps setting higher than 30 degrees is selected

When triggered, the landing gear warning system flashes the landing gear unsafe light and activates the warning horn. The warning horn can be silenced by pressing the “LDG WARN HORN SILENCE” button.

Emergency Landing Gear Extension

The landing gear can be manually lowered using an emergency handle placed under a cover between the front seats.

Figure 22: Click in the position indicated by the arrow pointer to remove the handle cover

To lower the landing gear after a landing gear failure:

1. Ensure speed is 108KIAS or below
2. Set Flaps 20°
3. Check the Landing Gear Switch is DOWN
4. Check Landing Gear Indicator: the gear IS NOT DOWN and LOCKED
5. Pull the LDG PWR Circuit Breaker to disable the landing gear motor power
6. Remove the Landing Gear Manual Extension Handle Cover as shown in the picture above
7. Crank the Manual Extension Handle about 27 times. Each click over the red knob will turn the handle once.
8. Check Landing Gear Indicator: the gear is not DOWN and LOCKED
9. Stow the handle and put the cover in place
10. Perform a normal landing

NOTE

The emergency handle won't rotate anymore once the landing gear is down and locked.

CAUTION

If the LND PWR Cirbuit Breaker is not pulled, cranking the handle will not have any effect for the landing gear system will raise the landing gear as soon as the handle is cranked.

CAUTION

During practice, never retract the gear using the emergency system.

Tires

The Reality Expansion Pack simulates the tire status and failure based on the landings done in the past.

A flat tire can cause the plane to yaw during the landing run or get it stuck on the ground before taxi.

In the “Landing Gear & Brakes Status” page of the Maintenance Report you can:

- Check the **status** of each tire
- **Fix** a faulty tire

Brakes

The SF.260D has a single-disc, hydraulically-actuated brake on each main landing gear wheel. Each brake is hydraulically connected to a cylinder attached to each of the pilot’s rudder pedals.

The brakes are operated by applying pressure to the top of the rudder pedals, which are interconnected. When the airplane is parked the brakes may be activated using the parking brake switch located under the pilot’s yoke.

To avoid brake failures, keep the brake system properly maintained and minimize brake usage during taxi operations and landings.

Do not apply the brakes for a long time. If the runway is long, let the plane slow down by itself.

In the “Landing Gear & Brakes Status” page of the Maintenance Report you can:

- Check the **status** of the braking system
- **Fix** a faulty brake

Wing Flaps

The wing flaps are continuous mode. They can be set at any value between 0° and 50°.

The wing flaps are controlled by a three-position switch on the instrument panel. Keep the switch pressed up or down to raise or lower the flaps. The flaps will move until the switch is pressed.

The wing flaps actuation from 0° to 50° takes approximately 5 seconds.

The position of the flaps is indicated by the flaps position indicator.

The control and position indicator are powered by the primary bus via the FLAPS circuit breaker.

The flaps indicator will reach the white mark left of “UP” when no power is supplied.

Figure 23: Flaps indicator represented with no power supplied

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NOTE: Flaps Controls

Remember that you must keep the flaps up/down buttons pressed to make the flaps move.

Three more commands are available that toggle the up/down movement of the flaps. Press the command once to make the flaps start moving.

The commands are **simcoders/rep/controls/flaps_down_continuous**, **simcoders/rep/controls/flaps_up_continuous** and **simcoders/rep/controls/flaps_neutral**

NOTE

With the aircraft on the ground the flap pointer reaches 50° setting. While in flight, it will range betwen 45° and 50°. This is due to aerodynamic forces acting on the wing flaps.

Canopy

The canopy can be opened and closed by dragging the canopy handle or by using the default X-Plane commands to open and close the aircraft door #1.

The following extra commands are available by REP.

Command	Description
simcoders/rep/canopy/open_a_bit	Open the canopy a bit
simcoders/rep/canopy/close_a_bit	Close the canopy a bit

NOTE

The canopy can be kept open few inches when the airspeed is below 120KIAS. Above 120KIAS the canopy must be closed and locked.

Cabin Ventilation System

The SF.260D is provided with a cabin ventilation and windshield defrost system controlled by three knobs.

- **Vent Knob**: controls the amount of air that is driven from the air scoop to the cockpit. The highest amount of air reaches the cockpit when the knob is fully pulled. The amount of air scooped depends on engine RPM and airspeed.
- **Heat Knob**: controls the amount of Vent air that passes through the engine heat exchanger. The highest amount of air is heated when the knob is fully pulled. The engine must be warmed up properly to ensure sufficient heat.
- **Defrost Knob**: controls the amount of Vent air that goes to the window defrost outlets. All the vent air is rerouted to the windshield defrost outlets when the knob is fully pulled.

Pull all the knobs to ensure the maximum defrost capability. Pulling the Vent Knob will ensure maximum air intake. Pulling the Heat Knob will ensure maximum heat. Pulling the Defrost Knob will ensure that the maximum amount of air is rerouted to the windshield. **The higher the airspeed, the higher the amount of air scooped and rerouted to the windshield**.

Figure 24: The cabin ventilation knobs are placed near the throttle column

ADVERSE WEATHER OPERATION

Introduction

This section discusses the procedures for flying the aircraft in adverse weather conditions.

Thunderstorms

Flying in thunderstorms must be avoided. If thunderstorm cannot be avoided, proceed as follows:

1. Attitude - Maintain the attiude by reference to the attitude indicator.
2. Airspeed - Adjust power as necessary to stay below 187 KIAS.
3. The altimeter may be unreliable because of the turbulence within the storm.
4. Use pitot heater and alteraate air.
5. Adjust the instrument panel light intensity so as to minimize blinding effect of lightnings.

Snow, Ice and Rain

The aircraft is not provided with anti-icing systems forwing, empennage and propeller and therefore the flight in ice conditions shall be avoided.

If ice conditions cannot be avoided use the Pitot tube heater, Aalternate Air and windshield defrost systems.

When there's visible moisture, the Carb Heat knob must be operated to avoid carburetor icing at low engine RPMs.

Effects of Snow, Ice and Rain during takeoff

Take-off shall not be attempted with ice and snow on the lifting surfaces or accurmulations on any other surfaces that may adversely affect aircraft performances.

When taxiing on ice or snow the directional control requires maximum attention bearing in mind that both steering and brakes could be ineffective and normally only the rudder maintains effectiveness.

Effects of Snow, Ice and Rain during landing

Landing on ice, snow or wet runway requires maximum care.

After good contact apply brakes gently.

Should the aircraft show a tendency to swing, release the brakes and correct the swerving tendency using the rudder pedals.

Cold Weather Procedures

Engine starting is sometimes difficult in cold weather. The use of an external power source, instead of the aircraft battery, is recommended for starting.

Hot Weather Procedures

No particular problem is involved in aircraft operation by hot weather. Ground run should be accomplished as quickly as possible to prevent engine overheating. During prolonged operation at maximum power at low indicated airspeed, monitor oil and cylinder head temperatures.

HUMAN FACTOR

Hypoxia

Hypoxia is a condition in which the body or a region of the body is deprived of adequate oxygen supply at the tissue level.

As altitude is gained, the partial pressure of Oxygen gets lower and lower to the point that the human body is unable to absorb enough quantity of it to sustain life.

The symptoms of hypoxia are:

- Apparent personality change
- Impaired judgement
- Headache
- Tingling
- Increased rate of breathing
- Muscular impairment
- Memory impairment
- Visual sensory loss
- Tunnel vision
- Impairment of consciousness
- Cyanosis
- Unconsciousness
- Death

The Reality Expansion Pack simulates some of the symptoms above, such as the tunnel vision, the increased rate of breathing and the muscular impairment.

TUC & EPT

Time of Useful Consciousness (TUC) is the time available for the development of hypoxia and the pilot to do something about it. It is not the time to unconsciousness but the short time from a reduction in adeguate oxygen until a specific degree of impairment, generally taken to be the point when the individual can no longer take steps to help him/herself.

Effective Performance Time (EPT) is always within and shorter than TUC. Its quantification however depends on the individual.

The following is a table that represent the EPT simulated by REP.

Altitude (ft)	EPT
10000	Few hours
15000	40 minutes
20000	10 minutes
30000	30 seconds
40000	15 seconds
45000	1-2 seconds

Figure 25: Hypoxia effect

HOME COCKPITS/CUSTOM DATAREFS

In order to work properly, REP uses a set of custom datarefs instead of default X-Plane ones.

Here you find a list of datarefs that you can use for your home cockpit.

This list includes all REP's datarefs. Some of them might not be present on some REP, depending on the systems depicted by the package.

Dataref: simcoders/rep/stallwarning/on

- Type: int
- Writable: No
- Contents: 0 = off, 1 = on

Dataref: simcoders/rep/stallwarning/level

- Type: int
- Writable: No
- Contents: 1 = low, 2 = high

Dataref: simcoders/rep/cockpit2/gauges/indicators/vacuum

- Type: float
- Writable: No
- Contents: Vacuum gauge value

Dataref: simcoders/rep/cockpit2/gauges/indicators/attitude_indicator_0_pitch

- Type: float
- Writable: No
- Contents: Main attitude indicator pitch

Dataref: simcoders/rep/cockpit2/gauges/indicators/attitude_indicator_0_roll

- Type: float
- Writable: No
- Contents: Main attitude indicator roll

Dataref: simcoders/rep/cockpit2/gauges/indicators/attitude_indicator_1_pitch

- Type: float
- Writable: No

- Contents: Stdby attitude indicator pitch

Dataref: simcoders/rep/cockpit2/gauges/indicators/attitude_indicator_1_roll

- Type: float
- Writable: No
- Contents: Stdby attitude indicator roll

Dataref: simcoders/rep/cockpit2/gauges/indicators/airspeed_kts_pilot

- Type: float
- Writable: No
- Contents: Pilot airspeed

Dataref: simcoders/rep/cockpit2/gauges/indicators/airspeed_kts_copilot

- Type: float
- Writable: No
- Contents: Copilot airspeed

Dataref: simcoders/rep/cockpit2/gauges/indicators/altitude_ft_pilot

- Type: float
- Writable: No
- Contents: Pilot altitude

Dataref: simcoders/rep/cockpit2/gauges/indicators/altitude_ft_copilot

- Type: float
- Writable: No
- Contents: Copilot altitude

Dataref: simcoders/rep/cockpit2/gauges/indicators/vvi_fpm_pilot

- Type: float
- Writable: No
- Contents: Pilot VSI

Dataref: simcoders/rep/cockpit2/gauges/indicators/vvi_fpm_copilot

- Type: float

- Writable: No
- Contents: Copilot VSI

Dataref: simcoders/rep/cockpit2/switches/avionics_power_on

- Type: int
- Writable: Yes
- Contents: Avionics switch

Dataref: simcoders/rep/indicators/fuel/fuel_quantity_0

- Type: float
- Writable: No
- Contents: Fuel kg in tank 0

Dataref: simcoders/rep/indicators/fuel/fuel_quantity_ratio_0

- Type: float (ratio 0..1)
- Writable: No
- Contents: Fuel ratio in tank 0

Dataref: simcoders/rep/indicators/fuel/fuel_quantity_1

- Type: float
- Writable: No
- Contents: Fuel kg in tank 1

Dataref: simcoders/rep/indicators/fuel/fuel_quantity_ratio_1

- Type: float (ratio 0..1)
- Writable: No
- Contents: Fuel ratio in tank 1

Dataref: simcoders/rep/indicators/fuel/fuel_quantity_2

- Type: float
- Writable: No
- Contents: Fuel kg in tank 2

Dataref: simcoders/rep/indicators/fuel/fuel_quantity_ratio_2

- Type: float (ratio 0..1)
- Writable: No
- Contents: Fuel ratio in tank 2

Dataref: simcoders/rep/indicators/fuel/fuel_quantity_3

- Type: float
- Writable: No
- Contents: Fuel kg in tank 3

Dataref: simcoders/rep/indicators/fuel/fuel_quantity_ratio_3

- Type: float (ratio 0..1)
- Writable: No
- Contents: Fuel ratio in tank 3

Dataref: simcoders/rep/engine/fuelline/electrical_feed_0/switch_on

- Type: int
- Writable: Yes
- Contents: L tip pump switch (1 = on)

Dataref: simcoders/rep/engine/fuelline/electrical_feed_1/switch_on

- Type: int
- Writable: Yes
- Contents: R tip pump switch (1 = on)

Dataref: simcoders/rep/indicators/fuel/fuel_flow_0

- Type: float
- Writable: No
- Contents: L FF indicator

Dataref: simcoders/rep/indicators/fuel/fuel_flow_1

- Type: float
- Writable: No
- Contents: R FF indicator

Dataref: simcoders/rep/cockpit2/gauges/indicators/engine_0_rpm

- Type: float
- Writable: No
- Contents: L RPM indicator

Dataref: simcoders/rep/cockpit2/gauges/indicators/engine_1_rpm

- Type: float
- Writable: No
- Contents: R RPM indicator

Dataref: simcoders/rep/cockpit2/engine/actuators/fuel_pump_0

- Type: int
- Writable: Yes
- Contents: L pump (0 = off, 1 = on)

Dataref: simcoders/rep/cockpit2/engine/actuators/fuel_pump_1

- Type: int
- Writable: Yes
- Contents: R pump (0 = off, 1 = on)

Dataref: simcoders/rep/cockpit2/engine/actuators/low_fuel_pump_0

- Type: int
- Writable: Yes
- Contents: L LO speed pump

Dataref: simcoders/rep/cockpit2/engine/actuators/low_fuel_pump_1

- Type: int
- Writable: Yes
- Contents: R LO speed pump

Dataref: simcoders/rep/cockpit2/engine/actuators/high_fuel_pump_0

- Type: int
- Writable: Yes
- Contents: L HI speed pump

Dataref: simcoders/rep/cockpit2/engine/actuators/high_fuel_pump_1

- Type: int
- Writable: Yes
- Contents: R HI speed pump

Dataref: simcoders/rep/engine/electrical_fuelpump/switch_on_0

- Type: int
- Writable: Yes
- Contents: L pump (0 off, 1 LO, 2 HI)

Dataref: simcoders/rep/engine/electrical_fuelpump/switch_on_1

- Type: int
- Writable: Yes
- Contents: R pump (0 off, 1 LO, 2 HI)

Dataref: simcoders/rep/engine/cowl/handle_ratio_0

- Type: float (ratio 0..1)
- Writable: Yes
- Contents: L cowl flaps handle

Dataref: simcoders/rep/engine/cowl/handle_ratio_1

- Type: float (ratio 0..1)
- Writable: Yes
- Contents: R cowl flaps handle

Dataref: simcoders/rep/engine/oil/temp_f_0

- Type: float
- Writable: No
- Contents: L oil temp (F)

Dataref: simcoders/rep/engine/oil/temp_f_1

- Type: float
- Writable: No
- Contents: R oil temp (F)

Dataref: simcoders/rep/engine/oil/temp_c_0

- Type: float
- Writable: No
- Contents: L oil temp (C)

Dataref: simcoders/rep/engine/oil/temp_c_1

- Type: float
- Writable: No
- Contents: R oil temp (C)

Dataref: simcoders/rep/engine/oil/press_psi_0

- Type: float
- Writable: No
- Contents: L oil press (PSI)

Dataref: simcoders/rep/engine/oil/press_psi_1

- Type: float
- Writable: No
- Contents: R oil press (PSI)

RESOURCES & HOW-TOs

SimCoders.com blog contains tons of resources that you will find very useful when using REP.

Moreover, this is a list of How-Tos available.

- How to lean the mixture
- How to keep the spark plugs clean
- How to choose the right oil for your engine
- How to quickly startup the engine with REP
- How to manage an emergency
- How to calculate the required fuel for your flight

SUPPORT & CONTACTS

Before requesting support, please check our FAQs, where you'll find answers to common questions about installation issues and general usage.

If you experience any technical problems with our software, feel free to contact us at support@simcoders.com. To help us assist you efficiently, please provide a detailed description of the issue and include your X-Plane Log.txt file.

VERSION CHANGELOG

V4.8.12

1. Fix: the transponder reported the wrong pressure altitude in XP12
2. Fix: the engine CHT was too high in XP12.1+
3. Improvement: Added the HSI compatibility mode for improved external hardware compatibility

V4.8.11

No change for this aircraft

V4.8.10

No change for this aircraft

V4.8.9

1. Improvement: propeller lever manipulator is now improved for VR usage

V4.8.8

No change for this aircraft

V4.8.7

1. Improved roll authority in XP12.1+

V4.8.6

No change for this aircraft

V4.8.5

V4.8.4

1. Fix: the Settings menu was not managed properly in VR

V4.8.3

1. No changes for this airplane.

V4.8.2

1. Fix: the system time was not always read correctly, therefore some features (like the time-based maintenance actions may not always work propely on some systems)
2. Improvement: better yaw behavior in XP12

V4.8.1

1. Fix: engine vibrations at startup were not visible anymore
2. Improvement: adjusted rudder trim tab in X-Plane 12
3. Fix: the RNP GP was not working in X-Plane 12

V4.8.0

1. Support for time and ground speed multiplier

V4.7.14

1. No change for this airplane

V4.7.13

1. No change for this airplane

V4.7.12

V4.7.11

1. Improvement: XP12 rudder sensitivity at high speed
2. Improvement: more realistic power drop when using alternated air (fuel injected version only)
3. Improvement: the tie downs should better lock the plane to the ground

V4.7.10

Fix: after loading a saved flight, the alternator may not work properly

V4.7.9

1. Fix: in some engine configuration and bus loads, the alternator could not charge the battery completely

V4.7.8

1. Fix: In X-Plane 12 the plugin forces could bump the plane at engines stop
2. Fix: memory leak in datarefs handling

V4.7.7

V4.7.6

1. Fix: some sounds would not stop playing after plane crash
2. Fix: fuel totalizer fix in XP12

V4.7.5

1. Fix: C.G too aft in X-Plane 12
2. Fix: The Garming G1000 brightness was set too low on XP12

V4.7.4

1. Fix: C.G too aft in X-Plane 12

V4.7.3

1. Fix: Some components of the maintenance window were misplaced
2. Fix: Mass And Balance could not be applied correctly if the flight was started with the engines running
3. Fix: fuselage resonance sounds on startup/shutdown too loud in X-Plane 12

V4.7.2

1. Fix: crash after replay

V4.7.1

1. Fix: crash after pause

V4.7.0

1. **New**: improved XP12 Flight Dynamics
2. Improvement: support for new XP12 rain effects
3. Fix: improved pitch and roll trim tab settings in XP12
4. Improvement: better alternator voltage simulation at low RPM
5. Improvement: support for Apple M* processors
6. Improvement: better compatibility of the Mass and Balance system with X-Plane 12
7. Improvement: it is now possible to vertically move the in-flight tips windows (no VR support for this feature at the moment)
8. Fix: missing library link if XP12

V4.6.6

1. Improved REP sound compatibility with internal X-Plane sound sliders

V4.6.5-h2

1. Fixed broken plugin reset

V4.6.5-h1

1. Fixed broken dataref

V4.6.5

1. Improved OpenAL errors log
2. Improved braking system compatibility with hardware toe pedals
3. Improved static elements compatibility with third-parties addons

V4.6.4

1. No changes for this plane

V4.6.3

1. No changes for this plane

V4.6.2

1. Improvement: MAP behavior at low RPM

V4.6.1

V4.6.0

1. Change: “Smooth Brakes” and “Automatic Differential Brakes” options merged into the “Advanced Braking” option
2. New: REP now includes TXT format checklists too
3. Improvement: Experimental Flight Model Support
4. Fix: the autostart did not set the fuel selector on the more empty main tank
5. Improvement: better LOP cut-out behavior in piston engines
6. Improvement: more realistic piston engine power response when running ROP
7. Improvement: more realistic manifold pressure behavior at high RPM
8. Improvement: running oversquare when LOP does not damage the piston engines
9. Improvement: REP waits for the real weather to load (if enabled) before updating the engine temperatures at startup
10. Improvement: improved hypoxia recover at low altitude
11. Fix: the manifold pressure was too low at idle
12. Fix: The REP update loop was not always executed correctly in certain configurations
13. Fix: The avionics is less prone to damage if the alternator is turned on/off with the avionics master on

V4.5.12

1. Improved towing behavior
2. Added engine cooling down sounds (exhaust ticks)
3. No changes for this plane

V4.5.10-h1

1. Fix: on Linux the plugin could crash the sim on startup because of a bad library link

V4.5.10

1. A cancel window is shown before beginning the engine autostart procedure
2. Fix: the instrument wear could not save its state properly on some systems

V4.5.9

1. Improved the FSEconomy implementation reliability
2. Improved manifold pressure algorithm
3. It is possible to choose the behavior of the Low Fuel lamp (military version only)

V4.5.8

1. Improved the hardware rudder pedals compatibility (it is now possible to disable the automatic differential braking)

V4.5.7

1. Fix: in the G1000 version, the GFC700 flight director was not behaving as expected

V4.5.6

1. New: REP Economy System now supports X-CPL-Pilot
2. Fix: in the maintenance window, some text could oveflow from the borders
3. Fix: in some configurations, the installer may not properly modify the FMOD .snd files

V4.5.5

1. The static elements are not visible anymore during replay
2. REP reports in X-Plane's log when a damage/failure is taking place
3. The damage caused by running the engine in the redbox was not always calculated properly
4. Fix: missing magnetic compass reference line
5. Fix: the magnetos texture did not repor the "Push" text

V4.5.4

1. Fixed the headset not muffling the engine sounds
2. Attempting to fix a crash while switching to VR

V4.5.3

V4.5.2

V4.5.1

1. Fix: the oil pump failure message was missing

V4.5.0

1. New: improved VR support in walkaround and towing modes
2. The magnetos are forced to “both” when starting the flight with engines running
3. The tiedowns and chocks are removed when starting the flight with engines running
4. New: it is now possible to fix the propeller in the maintenance window
5. Fix: wrong HDG manipulator in the G1000 cockpit
6. Fix: in the military version, in some situations the tip trans pump did not switch off properly
7. Improved the “Fuel System” chapter of this user manual
8. Improved compatibility between GTX330 and GTN750 transponders
9. Fix: CTD when trying to connect to FSE
10. Fix: Typos in Maintenance Window
11. Fix: excessive oil comsuption when a cylinder is partially worn out

V4.4.6

1. Improved pitch stability with modern joysticks
2. Fix: leaving the replay with gear up could cause a plane crash if replay was started on the ground
3. Fix: the O-540 version showed the improper fuel pressure values
4. Fix: checklists typo
5. Fix: removed the carburetor air temperature gauge from the BAF version

V4.4.5

1. Fix: the BAF version alternate engine air knob did not work properly
2. Fix: the fuel injectors state was not saved properly
3. BAF Version: added the aileron trim support
4. Added keyboard commands to control the EGT gauge reference needle
5. The in-flight tips window now resize correctly in VR
6. Optimizations for XP11.50
7. Some sounds (very few) were played using the wrong equalizers resulting in too high or too low volume in relation to their position in the cockpit

V4.4.4

1. Fix: XP10 crash on reload
2. Fix: CTD on plugin disable
3. Fix: fuel selector did not work properly since v4.4.3

V4.4.3

1. New: dataref to control the wind volume: simcoders/rep/settings/wind_volume
2. Fix: memory leak

V4.4.2

1. New: the standalone fuel market support USA airport codes 3 chars long
2. Fix: large windows did not fit the screen properly

V4.4.1

V4.4.0

1. The simulator<->REP interface has been reworked to accommodate future improvements

V4.3.5

1. FSEconomy: fix for HTTPS protocolo update

V4.3.4

1. FSEconomy: fixed connection issue (HTTP 301 not followed properly)

V4.3.3

1. Added the pitch and power settings table in the kneeboard
2. Fix: The KFC225 autopilot did not show the REV status properly

V4.3.2

1. Fix: the com radio status was not properly restored

V4.3.1

1. New option to show or hide the generic messages
2. Improved the Nav/Com radios status feedback in the maintenance window
3. Fix: the maintenance window could crash during the FSEconomy data update

V4.3.0

1. **New**: improved engine sounds
2. **New**: military BAF version powered with fuel injected engine IO-540-E4A5
3. **New**: G1000 cockpit version
4. Improved mixture system behavior
5. Updated librain effect plugin
6. Fix: the GTX330 did not respond properly to the press of the 8, 9, CRSR, and CLR keys while entering the TX code
7. Fix: The GTX330 was always loaded switched on even when it was switched off during pervious session
8. Fix: some textures had typos
9. Fix: the pilot arm could pop out of the canopy at certain stick position
10. Fix: the commands to control the ignition key were reversed
11. Fix: the EGT indicator could report negative values
12. Message to warn that the Experimental Flight Model is not supported
13. Engine Monitor shows CHT and Oil Temperature
14. Fix: The preheater did not work properly
15. Fix: the Economy System status could be loaded only partially in some situations

16. Fix: the in-flight tips were not visible in VR. Thanks to sparker for helping debugging the issue.
17. Fix: walkaround CTD
18. Fix: message boxes did not support VR
19. Improved the engine negative torque model

V4.2.3

1. Fix: solved some windows positioning issues
2. Fix: in XP10 REP did not recognize opening a window as a paused sim state
3. Fix: the KFC225 autopilot did not provide pitch angle control via the up and down buttons in pitch mode
4. Improved startup behavior

V4.2.2

1. Fix: the tuned caused a CHT drop
2. Fix: improved CHT algorithm with X-Plane 11.35
3. Fix: the kneeboard and maintenance windows did not save their position properly, therefore they were not shown correctly after being popped out
4. Fix: and X-Plane 11.35 bug prevented REP from reading the proper airspeed

V4.2.1

1. No changes for this aircraft

V4.2.0

1. **New**: Simulation of Factory and Tuned exhaust effects
2. **New**: The status file are backed up before being overwrited
3. **New**: It is now possible to save the windows position between sessions
4. Improved manifold pressure behavior
5. Fix: the HSI source was not reset to NAV when switching from a GPS cockpit to a non-GPS one

V4.1.8

1. New: it is now possible to set the wind sound volume in REP's settings window

V4.1.7

1. CTD fix

V4.1.6

1. Minor Networking fix

V4.1.5

1. Increased the debug log for the Economic System

V4.1.4

1. No changes for this aircraft

V4.1.3

1. No changes for this aircraft

V4.1.2

1. No changes for this aircraft

V4.1.1

1. Fix: an alternator did not save its status properly
2. Minor fixes

V4.1.0

1. **New**: FSEconomy integration with the maintenance system
2. Fix: X-Plane crashed in case of airplane crash
3. Fix: the systems' damages where updated during replay as well
4. Fix: on XP10 some message windows were not shown properly
5. Fix: on multimonitor setups the in-flight tips were shown on the wrong monitor

V4.0.3

1. Fix: the aircraft serial number is now more randomized
2. Fix: the weight and balance traded "0Lt" of fuel when changing the passengers' masses
3. Fix: the initial status of the aircraft could not be reset properly
4. The spark plugs fouling in-flight tip is now easier to understand
5. Improved instruments behavior once weathered
6. The Tachometer Time is now only based on RPMs
7. Improved startup behavior
8. Fixed the rain effect under Mac OS

V4.0.2

1. **New**: advanced rain effect using Skiselkov's (Totoritko) rain library
2. **New**: World March livery
3. **New**: RealityXP GTN750 support
4. **New**: it is now possible to deactivate the brakes smoothing
5. Fix: fixed a crash when closing a plugin's window
6. Better gyros behavior

V4.0.1

1. Fix: some mouse clicks were not captured properly in the Maintenance Report window
2. Fix: it was not possible to properly change the oil filter using the Maintenance Report window

V4.0.0

1. **New**: Economic System
2. **New**: Added a settings page to the GTX 330 Transponder to set the custom VFR Code. See the User Manual's Garmin GTX330 Transponder section to see how.
3. Improved multimonitor support

V3.5.11

1. Vacuum Pump: the pump failure can be triggered using X-Plane failures menu
2. Attitude Indicator: the indicator failure can be triggered using X-Plane failures menu
3. Fix: changing livery or airport could not allow the aircraft to load its status properly

V3.5.10

1. Fix: Lights glow position in the right-seat cockpit
2. Fix: Bendix/King KX165A did not activate VOR1 properly
3. Minor fixes

V3.5.9

1. The Hypoxia warning is shown only when the TUC is lower than 20 minutes
2. Improved engine sounds
3. Improved carburetor icing behavior
4. Improved canopy "open/close a bit" commands behavior
5. **New**: Right seat cockpit layout
6. **New**: Support for RealityXP GTN650
7. **New**: Printable short checklists included in the package
8. Fix: the KX165A Nav Com 1 prevented the GNS430 to startup properly
9. Fix: the GTX330 Transponder did not properly switch to GND mode after landing

V3.5.8

1. Minor fixes

V3.5.7

1. **New**: It's now possible to switch between a GNS430 and No-GPS avionics layout.
2. Fix: the state loading could load incomplete data on some systems
3. Minor fixes

V3.5.6

1. Better fuel flow at startup
2. It's now possible to paste the text in the licence box
3. Fix: saving a state file could have caused a crash on some specific system configurations
4. Fix: the static elements are better managed after leaving the replay mode
5. Fix: in some cases REP was unable to retrieve the correct system time
6. Improved user manual: added the Limitations section
7. Improved user manual: added the aerobatic figures entry speeds
8. Improved checklists
9. Improved fuel pressure behavior
10. Improved carburetor icing behavior
11. New commands are available to control the fuel selector
12. Fix: an X-Plane bug could have let the engine run with no fuel in the tanks!
13. Fix: the stall buffeting sound was audible at the outside
14. Fix: Correction of inverted manipulation of Flaps at certain angles of view.
15. Fix: Changed order of Time and DME in switch to not produce mistakes.
16. Fix: Shorten ADI pointers to allow better reading of numbers that were behind the arrows.
17. Fix: Corrected Fuel selector gauge labels of I-LELM and Stormo70 New liveries
18. Fix: the propeller animations broke other aircraft's animations
19. Fix: Added Night illumination to 15 CB
20. Fix: Corrected reference card label speeds to actual SF260D
21. Fix: Added Landing Light illumination in non-HDR mode.
22. Fix: Added VRUsers.zip with files with better compatibility in VR mode. Joystick won't hide with hands controllers and REP menu hit point in base of 3D Joysticks.
23. Fix: minor fixes to the Bendix/King KX165A Nav/Com radio
24. Fix: better fuel flow behavior
25. Fix: corrected the turn indicator dataref

V3.5.5

1. Fix: In some cases the plugin was unable to recognize if the sim was paused or not. This could lead to some major issues, such airplane crash after leaving replay mode
2. Fix: the prop governor did not react correctly when controlled using a joystick axis
3. Fix: minor fixes to the sound engine
4. Fix: in some cases the engine temps were not updated correctly if the airplane was loaded in flight, causing the oil pump to seize
5. Fix: in some cases the liveries status were not loaded properly when changing from a livery to another of the same aircraft
6. Fix: under some conditions the flaps sounds was played when not necessary
7. Fix: the KFC225 autopilot did not follow the set NAV course properly
8. Fix: artifacts in livery registration (SF260_Matricula.obj)
9. Fix: the Bendinx/King KR87 did not apply the ADF mode properly
10. Fix: the Bendinx/King KR87 and KX165A timers did not properly format the elapsed time when counting hours
11. Fix: artifact on Night illumination with Nav1/Nav2 and Avionics label switch
12. Fix: left disappearing of Nav2 vor indicator.
13. Fix: F260 ICAO designator missing in the acf file
14. Allow GNS430 Popup touching the screen (it will popup 2 GNS430 in RealityXP option)

15. The “Toggle all batteries” command does not affect the Emergency Avionics switch anymore
16. It is now possible to disable the advanced steering algorithm
17. Minor fixes

V3.5.4

1. Minor Fixes

V3.5.3

1. Fix: fixed a compatibility issue with the sound engine
2. Fix: the parking brake lever was not properly set when parking brake was toggled using X-Plane default commands.

V3.5.2

1. Fix: the new OpenAL equalizer showed some incompatibility with 3rd party plugins. This update will try to work around them and prevent crashes. A better fix will be provided in future releases.
2. Fix: the parking brake lever was not properly set when parking brake was toggled using X-Plane default commands.

V3.5.1

1. Fix: the flaps handle did not move when the battery was off
2. Fix: the flaps motor sound was heard while checking the flaps during the walkaround
3. XP11.30 new hypoxia effect is now overridden and REP’s more precise hypoxia effect is used instead

V3.5.0

1. **New**: It is now possible to load a worn out airplane. Checkout the Persistent Aircraft and Components Wearing chapter.
2. **New**: The cockpit instrumentation wears out with time and can be fixed using the Maintenance Report
3. **New**: Hobbs Time and Tach Time are now counted separately for the airframe and the engines
4. **New**: It is now possible to move the viewpoint while in walkaround or towing mode. VR not supported yet. See the Towing and Walkaround sections for more information.
5. The static elements, such chocks and tie-downs, are now managed during replay
6. The propeller governor dynamics at low RPMs are much improved
7. Improved starter algorithm
8. Fix: under certain conditions, the fuel pump sounds where not stopped with the pump itself
9. Fix: a bug prevented the cylinders to fail properly and to report their compressions in the Maintenance Report
10. Fix: the hypoxia message was shown when the hypoxia was disabled
11. Fix: the oil filter get less clogged when it’s past TBO

12. Fix: the autostart broke if the weight and balance configuration was changed while it was running
13. Fix: The Maintenance Report and the Kneeboard were not dimmed correctly at night

V3.4.6

1. **New**: Automatic updates via SkunkCrafts Updater plugin
2. **New**: REP is now compatible with the Differential and progressive brakes for X-Plane 11 plugin
3. Improved documentation
4. Improved gyros spin-down behavior
5. Fix: failures and damages were triggered while in replay mode
6. Fix: the oil pressure needle was not visibile if the airplane was loaded with the engines running
7. Minor improvements

V3.4.5

1. **New**: It is possible to manage the static elements from the plugins menu
2. **New**: Command to toggle the static elements
3. **New**: Command to fix all systems
4. **New**: REP correctly recognizes the engine failures triggered by X-Plane
5. Fix: In the latest X-Plane versions the in-flight tip messages may have been not shown correctly
6. Fix: Some entries in the tech report were not clickable
7. Fix: Minor typos in kneeboard
8. The installer has been improved to work with all the airplane mods available over the Internet
9. More realistic hypoxia effect at lower altitudes
10. Improved documentation

V3.4.4

1. Minor fixes

V3.4.3

1. **New**: Improved engine torque algorithm
2. **New**: Improved sparkplugs fouling algorithm
3. **New**: Removed the mouse gestures to open the kneeboard
4. **New**: The checklists/mass and balance/towing mode/autostart are now accessible from the plugins menu as well as the lateral menu
5. **New**: a new command has been added to switch on the HI fuel pump
6. Improved multimonitor compatibility
7. Fix: oil pressure was sometimes too low
8. Minor fixes

V3.4.2

Internal test build – not released to the public

V3.4.1

1. Fix: missing input chars in textbox
2. Fix: input on multimonitor setup was not working as expected
3. Minor fixes

V3.4.0

1. **New**: Experimental VR Support
2. **New**: SDK 3.0 (Detachable) windows
3. Improved engine model
4. Minor fixes

V3.3.1:

1. Fix: Too rich mixture at full power
2. Minor fixes

V3.3.0

1. **New**: 100% custom engine model to replace the internal X-Plane piston engine
2. **New**: Engine monitor enables engine fine tuning during flight
3. **New**: Improved drag model
4. **New**: Improved walkround oil system check
5. **New**: Improved ground roll sounds
6. **New**: Improved ADI spoolup model
7. **New**: Walkaround keyboard commands
8. Minor fixes

V3.2.1

1. Fix: Loading and unloading the plugin more times caused a crash
2. Fix: If the flight was started with engine running, the mixture was set to idle-cutoff
3. Minor fixes

V3.2.0

1. **New**: 3D sounds
2. **New**: Advanced gyro wander
3. **New**: You can now check the pitot probe temperature during walkaround
4. **New**: Postflight walkaround
5. **New**: Lights check during walkaround
6. **New**: More information about the cylinders status
7. **New**: The hobbs hour are now saved in the airplane state file and restored the next session
8. Improved steering algorithm

9. Better startup sounds
10. Fixed a bug that caused the cylinders to not being fixed correctly after an engine seizure
11. The landing gear failures are based on actual gravity acceleration. Now the landing on sloped strips are more realistic.
12. Fix a bug that may caused the engine to not fail when it should have
13. Minor fixes and improvements

V3.1.1

1. **New**: The chocks and tie downs are checked before automatic start
2. **New**: The lateral menu can now be completely hidden (see the plugin settings window)
3. Improved flooded engine message
4. Better compatibility with the “Start with engine running” setting
5. Fix: the label colors in some walkaround views were incorrect
6. Fix (XP11 only): the wind sound volume is controlled by the environment sounds volume
7. Minor fixes

V3.1.0

1. **New**: Dynamic ground roll sounds
2. Minor fixes

V3.0.0

1. **New**: reworked user interface and graphics
2. **New**: automatic startup procedure
3. Improved flight dynamics in X-Plane 11
4. Fix: some throttle quadrants did not work correctly with REP
5. Minor fixes and improvements

V2.6.4

1. **New**: Flight dynamics improvements in both X-Plane 10 and 11
2. Fix: Minor fixes

V2.6.3

1. Fix: The right toebrake did not couple properly with external rudder pedals
2. Fix: The oil system “Refill” button was not clickable

V2.6.2

1. Fix: Minor fixes

V2.6.1

1. Fix: Checklists typos
2. Fix: Improved fuel pump sounds
3. Fix: The wheel brakes may be stuck after towing

4. Fix: Improved engines doppler and distance sounds
5. Fix: Damages disabled during replay
6. Fix: Improved the joystick compatibility with the new propeller governor

V2.6.0

1. **New**: Custom propeller governor

V2.5.1

1. Fix: Corrected the toe brakes algorithm

V2.5.0

1. **New**: Improved torque effect
2. **New**: Improved CHT and Oil Temperature algorithm
3. **New**: Oil temperature tips
4. **New**: Improved hypoxia effect & algorithm
5. **New**: Fuel & Oil check in walkaround mode
6. Minor Fixes

V2.4.0

1. **New**: Spark plugs dynamics:
    - The spark plugs get fouled when the engine runs at low RPMs
    - The default spark plugs can be replaced with the fine-wire ones
2. **New**: Hypoxia can now be disabled in the settings panel
3. **New**: The engine may be damaged by wrong ROP/LOP operations
4. Minor Fixes

V2.3.0

1. **New**: Hypoxia simulation
2. **New**: Oil filter simulation: need to replace it at every oil change
3. **New**: Oil pump damage simulation
4. **New**: Fuel filter simulation: need to replace it after TBO
5. **New**: Vacuum pump casual failure simulation
6. **New**: More realistic engine priming dynamics
7. **New**: Improved W&B simulation during flight
8. Fix: Minor bug fixes

V2.2.1

1. Fix: the installer did not apply some changes correctly

V2.2.0

1. **New**: Simplified installation
2. Fix: The analog and digital fuel flow gauges were not reporting the correct fuel flow under certain circumstances
3. Fix: Minor fixes

V2.1.0

1. **New**: Engine pre-heating and winterization kit
2. **New**: The avionics settings are restored after reloading the airplane
3. **New**: Better compatibility with other plugins that manage the state of the airplane (such as X-Bookmark)
4. **New**: The sounds volume is controlled by the Carenado volume knob
5. **New**: The lateral menu is dimmed at night
6. Fix: More realistic ground physics
7. Fix: The oil system is now reporting the correct oil quantity
8. Fix: Minor fixes

V2.0.3

1. Fix: The cowl flaps lever cannot be moved using the mouse wheel
2. Fix: The kneeboard images were cutted and not shown correctly

V2.0.2

1. **New**: Improved cylinders physics
   - The CHT temperature is now provided by a custom algorithm
2. **New**: Improved oil system
   - The oil temperature is now provided by a custom algorithm
   - The oil temperature and pressure depends also on oil quantity an quality
3. **New**: Improved touchdown sounds
4. Minor Fixes

V2.0.1

1. Fix: It was not possible to enter the walkaround mode if the “Cold and Dark” option was disabled
2. Fix: Typos in the towing tips
3. Fix: The Walkaround checklists were not correctly visible on smaller screens.

V2.0.0

1. **New**: Custom interactive walkaround and pre-flight procedures.
2. **New**: Custom airplane towing system
3. **New**: More advanced engine physics (especially for engine startup)
4. **New**: More complex damages system for the avionics, the engine and the landing gear such as:
   - Oversquare operation of the engine is not always allowed

- The tire are damaged if the brakes are active on touchdown

5. **New**: More in-flight tips
6. **New**: Custom menu that provides an easy access to REP's features
7. **New**: Stall buffeting effect (improved if HeadShake 1.5+ is installed)
8. Minor changes to the sounds system
9. Minor changes to the graphics system
10. Bug fixes

V1.0.2

1. **New**: Correct steering and ground roll physics, especially in cross wind conditions.
2. **New**: The Weight & Balance tool now predicts the C.G. position at landing.
3. **New**: HeadShake and REP integration to better simulate the engine vibrations of the TSIO-520 (Headshake v1.5 or higher required).
4. Fix: Improved compatibility with Saitek products.
5. Fix: Minor fixes.

V1.0.1

1. **New**: A tip is shown if the pilot is managing the plane's system in the wrong manner.
2. **New**: Some failures (such as the avionic's) are behaving in a more realistic way.
3. **New**: The parasite roll moment incorrectly reproduced by X-Plane is reduced.
4. **New**: The flooded engine behavior is now more realistic. If flooded, the engine may actually starts with closed mixture.
5. **New**: Engine manufacturer and model in the Hangar window.
6. **New**: Better oil color report in the Hangar window.
7. **New**: Added the "About" menu.
8. Fix: Sometimes, the joystick mixture axis was not correctly recognized.
9. Fix: Cranking a running engine does not reduce the engine's RPM anymore.
10. Fix: Cranking a running engine does not cause an avionics failure anymore.
11. Fix: The pilot altimeter's barometer was rendered incorrectly.
12. Fix: The propeller joystick axis was not working as expected.
13. Fix: The oil pressure was too high during flight.
14. Fix: Minor changes to improve performance and correct typos.

V1.0.0

1. Initial Release

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