

# SAAB 39E Gripen

Version 0.9

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## Introduction

Thanks for downloading the SAAB 39E Gripen for X-plane! The first version of the Gripen was developed by SAAB in the 1980's as a multirole replacement for the Viggen and Draken fighters of the Swedish Airforce. It has served with the Swedish Airforce since 1993 and has been continuously modernized through A/B/C versions to keep up with requirements, including NATO interoperability. The Gripen has also been exported and is currently in use with the Czech, Hungarian, South African and Thai airforces.

The model you have downloaded is an attempt to create a basic yet enjoyable rendition of the 'E' model Gripen, which is currently in late-stage testing before. The 'E' model is a vast upgrade of the Gripen platform and includes a new and more powerful engine, improved range performance and the ability to carry greater payloads. It also has a new AESA-radar, InfraRed Search and Track system, highly advanced electronic warfare and communication systems together with superior situational awareness. Confirmed customers of the 'E' Gripen currently includes the Swedish and Brazilian Airforces, however it is also being considered by a number of other countries as an affordable yet very capable alternative. For a country that does not need stealth/first-strike capability, it may be the most lethal and cost effective option available.

The Gripen 'E' is still undergoing testing and, being a steaming new military aircraft, there is obviously not much detailed information on systems and performance out there. I have however tried my best to create a model that looks and performs in a 'plausible' way, within some limits of X-Plane and based on the limited reference data available. My focus has been on handling and maneuverability (including realistic fly-by-wire controls), allowing you to fly around and have fun, while not spending much time on aircraft systems that inevitable will not behave exactly as the real thing anyway.

*Hope you enjoy this aircraft! For requests and suggestions, feel free to PM me at [forums.x-plane.org](https://forums.x-plane.org) (username 'Nils').*

## Features

### Performance model

- Plausible turn performance, low speed handling, landing distances and roll rates
- Aircraft capable of ~M1.2 super cruise as advertised by GE and SAAB
- Airfoil design + plugin augmentation emulates the additional lift and pitch-up moment generated by the accelerated airflow trailing the canard leading edges and back over the wing. The aircraft is controllable in the entire envelope with control surfaces deflected in a way that is consistent with 39C photo/video observations.
- Custom engine model to modulate thrust with Mach number and altitude. This was based on GE F404 engine data and translated to match the published max thrust of the F414 engine used in the 'E' version of the Gripen.

### Flight control system

- Realistic trim free and departure resistant flight in all speeds and maneuvers.
- Pitch inputs command load factor up to +9/-3 G and angle of attack is limited. At low speed, pitch control transitions to pitch rate demand to maintain precise control of the aircraft.
- Canards and elevons are trimmed independently to optimize lift and drag throughout the envelope. In landing configuration, canards move to the max nose up position, allowing the elevons to move down and act as flaps, providing additional lift.
- Following landing, while braking is applied, canards and elevons deflect to maximize drag and firmly press the aircraft down into the runway.
- Roll inputs control roll rate demand. At high angles of attack, roll commands are partially translated into rudder deflection to keep alpha and beta angles within limits.
- Yaw inputs control side-slip angle demand, except on the ground where they control rudder and nose-wheel steering with yaw rate feedback for stabilisation.

- Yaw and pitch control uses synthesized beta and angle of attack data to enable smooth control even in gusty conditions.

## Externals

- Detailed external model with animated gear, control surfaces and slats.
- Custom particle systems for more realistic afterburner, heat blur, aerodynamic vapor and supersonic shockwave effects

## Cockpit

- Best-effort 3D representation of the pilot workplace based on the limited photo references available
- Systems and functionality primarily aimed at enjoyable free flight and maneuvers. This is NOT a systems or 'study' simulator
- "HUD-only" 2D cockpit. Unfortunately, X-Plane does not yet allow us to create meaningful HUDs in 3D cockpits

## Sounds

- Custom FMOD sound model
- Highly dynamic and immersive exterior sounds, including fly-by effects and sonic boom
- Immersive and plausible interior sounds

## External stores

- 300 gal droptank
- Meteor long-range BVR missile
- IRIS-T heat-seeking high-off-boresight WVR missile

## Instructions

### Installation

1. Make sure you are running X-plane 11.30
2. Unzip contents into your x-plane/aircraft/ subfolder of choice
3. Go fly!

### Flight

- Load the aircraft with engines running.

- To enable the head-up-display symbology, click on the HUD or select '*Forward with 2-D panel*' (default key command 'Alt+w'). Change to 3d cockpit view ('w') to look around the cockpit with your mouse.
- Set full engine power and rotate off the runway at 120-150 knots, depending payload, at about 10-15 degrees nose up attitude.
- Accelerate to and maintain around mach .8 for climb and high altitude flight.
- In general, your engine is optimized for high mach numbers (super cruise) and is therefor able to produce considerably more thrust near or above the speed of sound, especially in thin air where performance would otherwise suffer. You should be able to maintain mach ~1.2 at around 30k feet altitude without afterburner. Max service altitude is just above 50k feet.
- The fly-by-wire control system will limit g-loads to +9/-3 G and angle of attack to around 25 degrees. Max roll rate is about 250 deg/s but this is greatly reduced with increasing angle of attack to maintain departure-free handling characteristics.
- Your wide-area-display (WAD) shows primary flight instruments and navigation map. To increase the range of your map etc, click the center of the map to bring up the G1000 control panel (not very realistic, but sometimes practical).
- To engage air targets, select 'missiles arm' on the small control panel on your lower left and then select target of choice and press your joystick button for 'fire armed selection'.
- To land the aircraft, reduce speed to around 250 kts using speedbrakes or sharp turns as required. Select gear down and maneuver the aircraft so that the HUD velocity vector symbol overlays the desired touch-down point. Gradually reduce speed to 125-150 kts, depending on weight, and a nose up attitude of 8-10 degrees. If a short landing distance is required, do not flare the aircraft but rather fly it into the runway 'carrier style'.