
GRIPEN AS A SMART WEAPON PLATFORM

GRIPEN, A SMART WEAPON ITSELF

Sweden has always touched our hearts as it comes to fine fighter jets. The Saab-Gripen fits in this tradition. Nevertheless we can call it a special performance that Sweden developed a fourth generation fighter jet by it self, if one considers the enormous cost of development that are involved. The Gripen is a particularly clever design, which can be really seen as a small tiger ! Saab tries to sell world-wide with a professional marketing concept which seems to be succesfull, and several countries already use this very capable fighter.

REPLACING THE VIGGEN.

Where ever did it begin? The Swedish Flygvapnet used the Saab Draken in service, which was later on joined by the Saab Viggen. At the time the Viggen faced end of life and Swedisch Air Force was seeking for a replacement there were several candidates from other manufacturers who could opt for this. Sweden however was keen to carry on the tradition and developed the Gripen, not only for their own benefit but this time clearly also to create an alternative on the foreign market. The Gripen would be capable to compete with the best types of airplanes. The first test-flight was made by Stig Holmström in 1988 and in 1996 the Gripen Trainings Centre started up at Satenas. The plane was indicated as 'JAS-39 Gripen' which stands for 'Jakt-Attack-Spaning' or fighter / attack / reconnaissance, a real multi-role airplane saw the light ! The name Gripen means Griffin, and is taken from the Saab-logo. It is a relatively light plane with only 70% empty weight of the F-16 and half that of Hornet or Rafale. The construction exists considerably of composite material, where about 20 to 30 % on the outside of the fuselage is made of carbon fiber, resulting in a very low radar profile.

The wing is known as a cropped delta wing with leading-edge flaps and trailing-edge drooping "elevons". High maneuverability is combined with the possibility of high angles of attack. A special requirement was laid down by the Swedish government; the airplane should be able to operate from emergency airfields (such as high-ways) with a runway less than 800m. Experiences with the application of the canard to the fuselage on the Viggen provided SAAB already the knowledge of the advantages of this feature in flight characteristics. On the Gripen they can move ninety degrees, acting this way as air-brake which decreases the landing speed substancially and also at low speeds flight behavior can be controlled better thanks to more lift. On a highway, the Gripen can be refuelled and rearmed by a five -member ground crew using one truck. Typical Swedisch is how they organize their fighterfleet to be less vurnable. The advantage is that the Gripen - in times of trouble - can be spread all over the country. According to the BAS-90 protocol this is executed in groups of six. Build in self test and an additional Auxiliary Power Unit (APU) make the plane less dependent on ground equipment. Entering data remains is accessible via a laptop computer.

ADVANCED TECHNOLOGY

The airplane is equipped with fly-by-wire technology which combines the high manoeuvrability with safety, by controlling limits, but still allows forces to 9-G. Next to this the fighter is equipped with an analog back-up. For the pilot a centered joy-stick and a left hand throttle control instrument are mounted, using the hands-on-throttle and stick (HOTAS) principle. His awareness is built up by a human-machine interface of three active matrix liquid crystal multifunction displays with a wide angle HUD and a modern canopy which provides even more overview than an F-16. A Ferranti-Ericsson PS-05 / A pulse Doppler radar based on the Blue Vixen radar GEC Marconi (Sea Harrier) detects, identifies and follows several high-and low-flying targets at a time using long-distance Wide Angle Search in air and High Resolution Mapping of the ground profile. The Gripen is perfect for Beyond Visual Range (BVR) operations through its Celsius AB Tactical Information Data Link System (Tidle). This way a formation Gripens has a constant picture of the radar sensors and other aircraft instruments of each other, secured by a jam-proof digital radio network while radar information can be sent over a distance of 500 kilometers to four fellow-pilots. In cooperation and linking sensors the awareness strongly increases and better decisions can be made. Information with ground targets may likewise be shared with ground units. Working as a pool the Gripen is even capable of breaking through an enemy radar-jam. Also tasks can be divided, one Gripen can jam a target while another one can track and eliminate this target. All these activities provide the opportunity for orderly instrument management in the cockpit. The Gripen has passive and active electronic warfare capability, while a Saab Avionics AR 830 Radar Warning Receiver (RWR) signals detection by enemy radar. Monitoring the engine is done digitally with Full Authority Digital Engine Control (FADEC). The engine is also an improved version of the General Electric F404J, it's very reliable and also applied in the F-18 Hornet. Sweden builds it under license as the Volvo Aero RM-12 bypass turbo-jet with a larger fan, more powerful and with an afterburner designed in Sweden. The Gripen includes some 30 km wiring, 60.000 parts and 40 computers.

ORDERS FROM ABROAD

Many elements from the Viggen era came back such as operating from highways and the use of data-link applications in which Sweden is a pioneer, but one thing did give Sweden little pain. They have never been able to export the Viggen because too many requirements were typically tailored to the Swedish requirements. They looked for a joint venture for the export sale, which was found with BAe Systems and the Saab-BAe Gripen was called AB. This way saab could take the profits of the marketing experience of BAe. The one-and two-seat versions in the Swedish Air Force with respectively 176 and 28 examples are JAS-39A and B versions, while the standard NATO version is indicated as JAS-39C and D, they include a provision for refueling in the air. Both Czech republic and Hungary use these versions (both with 12 one-seaters and 2 two-seaters). They choose for a lease-contract with Saab, and they experienced how a handful Gripens could easily replace a complete army of Mig-21's. They expect a lifetime of 30 years for the Gripen and agreed upon a contractual right to buy the planes after the 10-year lease-contract. The C and D versions were standard indicated as EBS (Export Baseline Version) or also called 'batch 3'. Sweden itself responded this way and had the A and B versions (from

2004) converted to batch 3 versions. Outside Europe, Saab found one customer in the South African Air Force (17 single-seaters and 9 two-seaters) and the Thai Air Force (6 units, starting delivery in 2011). Other countries that seek to replace their existing fighter aircraft, and so potential buyers, are Bulgaria, Croatia and Switzerland in Europe and also interest is shown in South American countries like Brazil and in Oman.

Orders from India, Romania and Poland were missed, they made other choices. Norway and Denmark are two countries determined to replace their F-16's, where Denmark also strongly looks at the Gripen while Norway committed itself already to the Joint Strike Fighter project. Now that the JSF project seems to get far too expensive, the other previous options don't seem to be all that bad after all. Saab by the way positions itself now as a direct concurrent for the JSF with an improved version. There's a lot to gain for Saab and there is much to say about Gripen's power, though the choice is on the governments. A little bit stealth of the Gripen, or complete stealth with the JSF, but on what cost ? The play concerns financial feasibility, economic use of defense funds and benefits for companies in the participating countries. The crisis seems to shuffle the cards well for Saab. The Gripen is reliable with an efficient training opportunity and low operational costs.

GRIPEN NG

The Gripen is constantly improved. The last batch 3 versions have a new inertial navigation system with GPS and improved Data Link 39 (CDL 39), a more powerful main-computer with five MILSTD 1553B data busses in stead of three, a more powerful RM-12UP engine and improved EWS-30 Electronic Warfare system. On may 27th of 2008 a new Gripen was airborne, with more modern technology. This model stands for NG or 'New Generation'. It includes a 25% more powerful engine, the General Electric F414G, also applied in the F18E/F Super Hornet which gives the plane the possibility to supercruise (mach 1.1 without afterburner) with armament. The tank-capacity has increased with 40% resulting in an increased range up to 4000 km. while the maximum take-off weight increased from 14.000 to 16.000 kg.

Under the wings some 6000 kg can be mounted. Even later, on november 5th 2009 a flight was made with a new type of antenna 'active electronically-scanned array' (AESA) radar from Selex Galileo named Vixen 500E. An array of programmable transmit-receive (TR) modules can operate parallel and work together which make it possible to jam and scan at the same time. This radar scans 200 degrees, which means also backwards ! This demonstrator has to lead to a JAS-39E/F production version. The latest technology is used and to make the Gripen even more attractive it is qualified to carry the most smart weapon-systems like the American AMRAAM, the British ASRAAM and the Iraelian Rafael Python 4 rocket systems and capable to carry other systems like the Litening targetpod and Thales Vicon 70 recce-pod. It is obvious that Saab will continue walking first line. Already there have been simulated tests for a sea-version for landing on a carrier. This was started to aquire an order from India for some hundreds of examples, but deliveries were blocked because of specific technology in avionics from Israel and U.S. were under protection and made it impossible to apply the avionics. The Gripen is so advanced and so very good in quality with an ideal price/performance ratio that it seems just a matter of time for new orders.

GRIPEN CHARACTERISTICS (BATCH 3)

Length	14,1m
Height	4,5m
Wingspan	8,4m
Wingsurface	25,5 square meter
Empty weight	6620 kg
take off weight	8720 kg
Max.take off weight	14.000 kg
Tank content	3300 L extra 2x droptanks a 1100 L is optional
Engine	1 x RM-12 Volvo Aero turbofan without afterburner 54 kN and with afterburner 81,9 kN or 8350 kg. thrust.
Speed	Mach 2 + (2470 km/u)
Accelleration	Mach 0,5 tot Mach 1.1 in 30 seconds
Range	1200 km
Fighting range	800 km
Max.wingload	336 kg/square meter
Thrust/weight ratio	0.97
'Ferry' reach	3200 km (with 2 droptanks)
Minimal runway	600m (landing 500m , start in interceptor mode 400 m)
Radar	Saab PS-05/A pulse doppler X-band radar
ECM	1 x ALQ-TLS ECM pod
Self-protection	BOP/B en BOP/C dispensers with 160 chaff or flares and BO2D RF decoy in supersonic flight EWS-30 EW system
Eject-seat	Martin Baker S10L zero zero (zero altitude, zero speed)
Hardpoints	8
Armament	1 x Mauser Bk-27 canon (120 rounds) 8 x Mk 82 bombs or 2 x Bk 90 cluster munition 6 x Rb 74 or Rb 98 air-air missiles or 4 x Rb 71 or Rb 99 of MICA or METEOR air-air missiles or 4 x Rb 75 air-ground missiles or 2 x KEPD 350 cruise missiles or 4 pods with 13,5 cm unguided missiles or 4 GBU-12 Paveway II Laser guided bombs (LGB) or 2 x Rbs.15F anti ship missiles

SWEDISH MISSILE INDICATIONS

Rb 71	license Skyflash
Rb 74	license AIM-9 Sidewinder
Rb 75	license AGM-65 Maverick
Rb 98	license IRIS-T (Infra-red Imaging System Tail/Thrust Vector controlled) i.c.w. Cobra helmet mounted sight
Rb 99	license AIM-120 AMRAAM