

## A brief look back at Saab's aviation heritage.

The Svenska Aeroplan Aktiebolaget (Swedish Aircraft Company), or Saab, got its start in 1937. Only a short time would pass before Europe would be engulfed in another World War, and Saab's production concentrated on military aircraft.

The factory, built just north of Trollhattan, soon produced such aircraft as the Saab 17, a light bomber, and the Saab 18, a medium-heavy bomber. After the war, Saab turned its attention to commercial aircraft, producing the Saab 90 Scandia (a 32 passenger airliner) and the Saab 91 Safir (a three-passenger pleasure and training aircraft).

Following on the heels of the Saab 91 project was Saab's first foray into automobile production: The Saab 92. A very aerodynamic package for its day, the Saab 92 utilized a two-cylinder, two-stroke engine. The two-stroke would become a hallmark of Saab vehicles for the coming years.

Saab continued to develop and market exciting, new models. The 93, 94 Sonett Super Sport, 95, 96, 97 Sonett II, 98 Sonett III, 99, 900 and 9000 automotive models followed in the years to come. The 900 gave way to the current 9-3 model line, and the 9000 is the predecessor to the 9-5.

Most of these models had, at key periods in Saab's history, high

performance editions. This rich heritage in performance is part of great cars like the 99 Turbo, the 900 SPG and the 9000 Aero, and what makes a Saab a Saab. The 9-3 Viggen, consequently, is a natural successor to these special editions.

The Saab G29 Tunnan (Swedish for "barrel") placed Saab in the jet age in 1948. Many more jet aircraft followed. In 1967, the Saab 37 Viggen took its maiden flight, and production started soon after. The Saab 37 Viggen filled the roles of a strike, training, reconnaissance and interceptor aircraft. Its technology was leading edge, indicative of advanced technology found on the Saab 9-3 Viggen.

A brief review of the Saab 9-3 Viggen's creation.

First shown as the SVO concept car at the Geneva Motor Show in 1996, the Saab 9-3 Viggen will be available initially in the coupe version.

All 1999 9-3 Viggen coupes sport a Lightning Blue exterior, along with a blue and yellow striped delta wing emblem, symbolic of the Saab 37 Viggen fighter jet. The jet age is, of course, the soulistic father of the 9-3 Viggen: aerodynamic, powerful and technologically advanced.

“We decided to turn to our aircraft heritage for inspiration.” – *Peter Leonard, Special Vehicle Operations team leader, Saab 9-3 Viggen project.*

TWR Corporation of England worked under the direction and guidance of Saab engineers to develop the potential offered by the Saab 9-3 and create the Saab 9-3 Viggen. TWR is the parent of the Arrows Formula One racing team. And it's not just its racing successes that speak: so does its history of engineering specialty performance cars. TWR understands the essence of performance, of handling. Engine tuning, chassis and seats were executed under the objectives that Saab set...and monitored.

Along with TWR, Saab works with Valmet of Finland, the specialty builder who assembles the Saab convertible and the Porsche Boxster. Together – Saab, TWR and Valmet – created the Saab 9-3 Viggen.

To underscore the Saab 9-3 Viggen's exclusivity, only 3,000 will be produced each year for *worldwide* enjoyment.

## The exterior.

At even a passing glance, it's easy to distinguish the Saab 9-3 Viggen from other Saab 9-3 models. The design reflects the 9-3 Viggen's high performance and superior control. The 9-3 Viggen is playful, designed to be fun and exciting to drive, and its design reflects those attributes.

Based on Scandinavian aesthetics, the lines are clean and simple, the stance low and aggressive. The 9-3 Viggen's aerodynamic body shape and rear spoiler reflect this model's aircraft heritage.

In profile, the lines produce a wedge shape, producing a strong impression of forward movement.

The Saab 9-3 Viggen has front bumpers and side skirts matched to the body color, emphasizing the front wheels and paying tribute to Saab's long history in front-wheel drive technology. The blue and yellow delta-shaped emblem is reminiscent of the 37 Viggen with its predominant delta wing design.

The low front air dam allows a larger part of the air to flow over the car and reduce drag. The front air dam also lowers the front profile, with side profiling that expands into a deep rear bumper apron.

The rear spoiler creates a low pressure area beneath the wing, essentially pulling the car down at the rear. This provides greater stability at high speeds and a more linear response to hard braking, which in turn reduces nose dive.

The side skirts, along with the low front air dam, help reduce drag.

All of these aerodynamic enhancements allow the Saab 9-3 Viggen to register a .31 drag coefficient, an eight percent improvement over the standard 9-3 (.325). At the same time, the rear spoiler is instrumental in increasing the downforce over 50%.

The Saab 9-3 Viggen uses a unique roof-mounted antenna, with a pre-amp mounted at its base.

*Benefit: The aerodynamic enhancements found on the 9-3 Viggen have improved the drag coefficient, fuel economy, noise levels and most of all, the handling of this model. Of course, one shouldn't overlook the aggressive stance the 9-3 Viggen strikes.*

## The interior.

The interior of the Saab 9-3 Viggen exudes the business-like atmosphere of a cockpit. All around the ambiance exudes the call to drive, to interact, to react, to heed the call of the open road or twisting switchbacks.

As with all Saab models, the interior controls, gauges and panels are logically arranged for the utmost in control and comfort. The cockpit feel comes through. The [metal-gray finish on the dash](#) contributes to this feel, and is complementary to the rest of the interior.

The Saab 9-3 Viggen's interior is covered predominantly in [Rocky Black leather](#), with special door and seat inserts. Initially, the first 9-3 Viggen models will have [Deep Blue textured leather inserts](#) to complement the Lightning Blue exterior. The [steering wheel](#) and [shifter](#) are also finished off in leather.

The [leather seats](#) are unique to the 9-3 Viggen, with [side bolsters](#) and [thigh supports](#) that lend the driver better control and comfort. The [Viggen symbol is embossed](#) in the [back rest](#) of the front and back seats, as well as the [door sill trim](#). The 9-3 Viggen features electrically adjustable front seats on both sides, with three-position memory on the driver's seat.

All the safety features one usually expects from a Saab can be found in the 9-3 Viggen. This includes the Saab Active Head Restraint (SAHR), pretensioning safety belt system, driver and front passenger supplemental restraint airbags, anti-submarining seat design (preventing occupants from slipping under the safety belt in the event of a collision) and load shifting protection.

The 9-3 Viggen's seats retain the front side supplemental restraint airbags, offering protection for the head and thorax regions of the body in the event of a side collision.

All 9-3 Viggen models use Saab's latest automatic climate control system, featuring an updated control panel, compressor, air outlets and air ducts for improved airflow.

The Saab 9-3 Viggen, like other 9-3 models, carries an improved anti-theft system. A digital code in the key fob arms and disarms the engine immobilizer to prevent theft. The digital code is rotated after every use of the key, with no less than four-billion code combinations possible for a high level of security.

*Benefit: The Saab 9-3 Viggen's interior offers comfort, safety and the ability to hold the driver for the long haul. Ergonomics make for easy control of the 9-3 Viggen. Saab's aviation heritage comes through in every respect.*



# The powerplant.

The heart of the 9-3 Viggen is under the hood: 225 horses ready to deliver an experience like never before. Coupled to an extraordinary chassis, the Saab 9-3 exudes its soul.

The 9-3 Viggen has under the hood an all-new four-cylinder engine displacing 2.3 liters coupled with a new high-output turbocharger that delivers 225 hp (165 kW) at 5,500 rpm and maximum torque of 252 ft.-lbs. (342 Nm) within a broad band of 2,500 - 4,000 rpm. The engine is a development of the Generation IV engines (B235R) that first debuted on the Saab 9-5 sedan and wagon models.

On top of the engine, the cam cover displays the Viggen symbol. Under the cover are dual overhead camshafts. The intake valves are sodium filled to withstand the higher temperatures common to turbocharged engines. The exhaust valves take this design one step further, with even greater heat-resistance due to their 5mm stems and nimonic alloy construction.

The Mahle pistons are reinforced and cooled by oil sprayed through jets found at the base of the block near the crankshaft. These jets spray upwards, aimed at the underside of the pistons.

The engine management system is Saab's state-of-the-art 32-bit microprocessor controlled Trionic T7 computer which controls the air-fuel ratio, Saab Direct Ignition (SDI) and turbo boost control. Unique to the Trionic T7 version, the system also controls the throttle electronically via "drive-by-wire" technology.

The focus is on midrange torque, giving great response at road speeds and delivering an incomparable driving pleasure.

Safety is also an issue, as a broad midrange torque band allows the Saab 9-3 Viggen to readily pass other cars on the highway.

The larger turbocharger used on the 9-3 Viggen is a Mitsubishi TDO4HL. It produces 20 psi (1.4 bar) of boost, Saab's largest amount of turbo boost yet. The exhaust turbine features heat resistant stainless steel. The bearing housing is also specially designed for heat resistance, utilizing water-cooled passages.

A new inlet duct design – larger in diameter and shaped for maximum efficiency – improves the flow of incoming air to the turbocharger. And since cool air is denser, the turbocharger system uses an intercooler to drop the temperature of the air going into the engine.

In the past, a larger turbocharger meant a larger lag time in response. No longer. Engineers, by carefully reprogramming the Trionic T7 system's software, have minimized the lag. The system can also manipulate the throttle plate position – opening it more quickly than the driver requested – so the engine can briskly reach the requested torque level.

For engine smoothness, Saab incorporated twin balance shafts: chain-driven shafts with eccentric counterweights that turn at twice the engine speed, eliminating the unwanted vibration and



harshness usually found in inline four-cylinder engines.

Coupled to the 9-3 Viggen is the five-speed manual transmission of the Saab 9-3, modified with the differential gears of a 9-5 to meet the specific power output of the 2.3-liter four-cylinder engine. Through special programming of the Trionic T7 engine management system, first gear has a torque limit of 184 ft.-lbs. (250 Nm). The second gear's torque limit is set at 243 ft.-lbs. (330 Nm). Third to fifth gears are unlimited, ready to provide the maximum 252 ft.-lbs. (342 Nm) of torque the 9-3 Viggen's engine has to offer.

The heavy-duty clutch – with hydraulic activation – and pressure plate is the same unit as used on diesel-equipped Saab models sold in Europe. This unit is designed to handle higher-torque engines. The pressure plate exerts a pressure of 1,530 pounds (6,800 N).

Driveshafts are derived from the Saab 9-5, with their larger diameter 1.08-inch (27.5 mm) but shortened by .95-inch (24mm) to accommodate the 9-3 platform. The constant velocity joints use a state-of-the-art 30mm diameter tripod design (as found in all 9-5 Turbo models), capable of handling the increased engine power. No vibrations emanate from the joints, not even during hard cornering.

*Benefit: The Saab 9-3 Viggen's 2.3-liter engine offers impressive performance, especially at the crucial midrange where cornering and passing takes place. Coupled with a stout manual transmission and clutch, the 9-3 Viggen is ready to provide driving pleasure, regardless of whether the driver is taking a cruise or taking the curves.*

## Saab Trionic T7 engine management system.

The brain of the Trionic T7 is a 32-bit microprocessor, capable of carrying out two million calculations per second. A veritable abacus that's turbocharged.

The microprocessor can monitor and control – simultaneously – fuel injection, Saab direct ignition (SDI), turbo boost pressure and electronic throttle control. Data signals are the brain of the Trionic T7 is a 32-bit microprocessor, capable of carrying out two million calculations per second.

Data signals are transmitted as digital codes containing a sequence of information that can be decoded and acted upon when received by other computer-based systems within the vehicle. Because the information is identifiable and specific, a single power lead and just one small-gauge data cable can replace a multitude of conventional wires.

Included is a drive-by-wire system, whereby the driver presses the accelerator pedal which moves the pedal position sensor, thus activating the throttle actuator located in the throttle body under the hood.

There is no direct linkage to the throttle plate.

Based on the driver's input, the system requests a certain level of torque and the throttle plate motor turns the throttle plate until the plate's position sensor value corresponds with the driver's input to the pedal position sensor.

The Saab Trionic T7 controls the combustion process by using



the spark plugs for measuring the combustion in each cylinder. A weak voltage signal is sent across the gap of every spark plug electrode after each combustion stroke. The voltage signal that returns to the control unit varies, depending on how many particles remain in the cylinder. This tells the control unit if proper and complete combustion of the fuel/air mixture is being obtained. If it is not, the Trionic T7 system can adjust the fuel quantity, ignition timing or boost pressure accordingly.

Each fuel injector is individually controlled and the incoming air entering the engine is calculated by atmospheric pressure, ambient temperature and air mass flow. The Trionic T7 system's micro-processor is so fast that it can even check these factors during the injection phase, making corrections mid-cycle if needed.

The Trionic T7 manages the Saab Direct Ignition (SDI) system. The SDI system has no distributor, hence no moving parts. Each spark plug has its own dedicated ignition coil mounted directly above the spark plug terminal. This eliminated the need for spark plug wires and all of their associated problems in damp or cold weather. It also protects the spark plug insulator from moisture and dirt and delivers a more reliable spark voltage – 40,000 volts, in fact – when needed.

With the Saab Trionic T7 engine management system, turbo efficiency is no longer a concern at low or high altitudes. The turbo will deliver the same amount of torque up to 10,000 feet (3,000 m). A charge air pressure sensor sends information to the T7 control unit about the incoming air pressure levels. Denser air requires a smaller throttle plate



opening, so this is adjusted accordingly based on ambient conditions.

*Benefit: The Saab Trionic T7 engine management system provides a technological edge in controlling engine functions, including the turbocharger. In the process, Trionic can extract the best performance from the engine, and extract a reliability that places peace of mind in the owner of a 9-3 Vigen.*

in height is offset by the Vigen's larger wheels, thus overall height remains close to the standard 9-3.

The rear springs have been stiffened by over 25 percent for optimized body control. The struts provide firmer responses to road irregularities, optimized stability and reduced roll tendencies. These qualities were obtained by recalibrating the strut's valving.

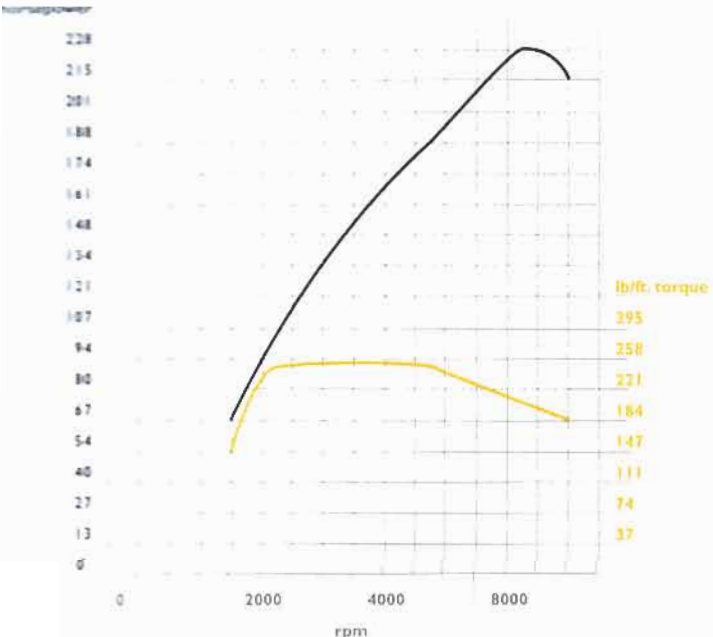
Engineers installed the standard-rated rear anti-roll bar to prevent the rear end from breaking away. The front anti-roll bar, however, has been slightly softened, being reduced from 1.02-inch (26mm) to .95-inch (24mm) in diameter. This helps with traction out of corners by preventing unwanted wheel lift.

The steering rack has firmer mounts to improve driver's feedback from the road and reduce torque steer. A reinforced mounting bracket secures the rack to the firewall. This bracket utilizes a stiffer rubber compound in the bushing between the bracket and the rack.

### The airframe.

The objective for chassis design was to enhance body control, achieve a good front to rear balance, obtain cornering flatness and stability, provide a good steering feel and offer exemplary sports-touring comfort. The other objective was to provide the driver with an exhilarating drive.

The springs have been shortened by approximately 3/8ths of an inch (10 mm) and upgraded to improve the front-to-rear balance of the 9-3 Vigen. This reduction



Model	Front springs	Rear springs
9-3	137 lbs./in. (24 N/mm)	241 lbs./in. (42.4 N/mm)
Viggen	142 lbs./in. (25 N/mm)	305 lbs./in. (53.3 N/mm)

The Saab 9-3 Viggen's 7.5 x 17-inch wheels – shod with Dunlop SP Sport 2000 215/45ZR17 tires – add up to approximately 1/2 inch (14 mm) in wheel track. The 9-3 Viggen's brakes have been substantially upgraded. The master cylinder and booster (from the Saab 9-5) hold a larger capacity and provide a better pedal feel. The brake calipers are large units painted black, holding pads with improved friction material for better fade resistance and stability.

The front brake discs are roughly .75-inch (20 mm) larger (308 x 25 mm) than standard 9-3 discs, and provide better ventilation thanks to their new design. The front and rear discs are grooved to improve wet-braking performance and better resistance to fade at high brake temperatures. The rear brake discs retain their standard size (286 x 10mm) in the interest of chassis balance.

The front and rear pad material on the 9-3 Viggen is semi-metallic. The base material is made of a new compound called Pagid 4, which dissipates heat better and improves friction performance. This material also prevents coning, or distortion of the brake pad surfaces. The front pads have a surface area of 9.07 square inches (58.5 cm<sup>2</sup>), versus 8.68 square inches (56 cm<sup>2</sup>) for standard 9-3 models. The front calipers use a single sliding piston design, with 2.24-inch (57mm) pistons. The rear calipers have a two-piston design, with piston diameter being 1.38 inches (35 mm) each.

*Benefit: The Saab 9-3 Viggen's suspension matches the performance of the 2.3-liter engine. It is not overly soft, which would negate the engine's power. It is not overly harsh, which would negate the sport-touring experience of the 9-3 Viggen.*



# Specifications.

## Engine

Type: in-line four cylinder (cast iron block, aluminum head) with high-output turbocharger, five main bearings and oil cooler

Displacement: 2.3 liters (2290 cc)

Bore: 90mm (3.5 inches)

Stroke: 90mm (3.5 inches)

Horsepower: 225bhp (165 kW)

@ 5,500 rpm

Torque: 252 ft.-lbs. (342 Nm)

@ 2,500-4,000 rpm

Compression ratio: 9.3:1

Maximum speed: electronically governed to 155 mph (250 Km/h)

0-60 mph: 6.4 seconds

0-100 Km/h: 6.7 sec.)

Fuel economy: 19 mpg city /

26 mpg highway

Combustion chambers: dome shaped, centrally positioned spark plug

Intake train: four valves per cylinder, hydraulic followers, dual overhead cams, chain driven

Harmonic control: dual balance shafts

Exhaust: free-flow system with three-way catalytic converter and Lambda sensor

Engine management: Saab Trionic T7 32-bit microprocessor (manages fuel injection, direct ignition, throttle and turbo boost pressure) with drive-by-wire throttle control

Ignition: Saab Direct Ignition

Turbocharger: Mitsubishi TDO4HL, water-cooled bearing housing, integrated wastegate and intercooler for incoming charged air

Alternator: 1755 W/130A units.

Transmission: five-speed manual transmission, all forward gears synchronized. Ratios: 1st - 3.38; 2nd - 1.76; 3rd - 1.18; 4th - 0.89; 5th - 0.66; reverse - 3.17. Final drive ratio: 4.05.

Fuel tank: 17 gallons (68 liters)

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Airframe:

Wheelbase: 102.6 inches (2,605 mm)

Overall length: 182.3 inches (4,629 mm)

Overall width: 67.4 inches (1,948 mm)

Height at curb weight: 56 inches (1,428 mm)

Track, front: 57.7 inches (1,466 mm)

Track, rear: 56.8 inches (1,442 mm)

Steering: power-assisted rack and pinion steering, impact collapsible, telescoping steering wheel.

Turning circle: 34.4 feet (10.5 m)



Brakes: Power-assisted disc brakes front and rear. Both front and rear brake discs are grooved, front discs are also ventilated. Braking system includes anti-lock brakes with electronic brake force distribution. Master cylinder uses a bore and stroke of 1 x 1.4 inches (25.4 mm x 36 mm). The brake booster is of a dual diaphragm design, approximately 7/8 inches (178/203 mm) in diameter.

Suspension, front: McPherson design with direct-acting gas-filled struts, split lower wishbones in forged aluminum and an anti-roll bar.

Suspension, rear: Torsion beam rear axle with inner and outer anti-roll bars. Sport-tuned coil springs and gas-filled shocks.

## The Saab 9-3 Viggen Flight Academy.

It came from out of the blue.

While everyone who buys a performance car expects *performance*, not everyone expects to learn about *performance driving* when buying a performance car.

The Flight Academy is as much of the Saab 9-3 Viggen as its 2.3-liter turbocharged four cylinder engine. The Flight Academy is a two-day intensive learning event held at Road Atlanta, exclusively for buyers of the 9-3 Viggen. The Flight Academy starts in 1999, with more sessions to follow in subsequent years (see [www.saabusa.com/viggen](http://www.saabusa.com/viggen) for more details on event dates).

The aim of the Flight Academy is to provide the Viggen owner with an experience that is out of the ordinary, much like the 9-3 Viggen is out of the ordinary.

This feature of the 9-3 Viggen definitely sets it apart from other performance cars. After all, the 9-3 Viggen is a Saab.

Saab 9-3 Viggen owners will take a trip to Road Atlanta in Braselton, Ga., to attend the two-day event. A mixture of classroom time, along with seat time during a number of exercises, will be awaiting all participants. Driving exercises at the Flight Academy include skid pad, braking, slalom, evasive maneuvers, autocross and downshifting. And the focus? Getting the most out of a front-wheel drive performance car, and doing so with practical performance driving meant for the road, not for the track.

The Flight Academy offers an instructor to participant ratio of 1:4. The instructors know how to handle a performance car; they are professional race car drivers.

While the cost of the Flight Academy is included in the price of a 9-3 Viggen, owners will provide for their own transportation to Road Atlanta, along with hotel accommodations and cuisine

needs. Saab will host a dinner for participants during one evening of the Flight Academy. This evening will include a chance to chat with Saab Cars USA management, and view a few classic Saabs from years past.

The Saab 9-3 Viggen Flight Academy: It's a chance for 9-3 Viggen owners to develop their wings.

*The Saab 9-3 Viggen – as with all Saabs – is a product of independent thinking, strong convictions and genuine beliefs emanating from its European and Scandinavian origins and distinctive aircraft heritage.*