# SWEDEN'S SKOOL MASTERS

The Swedish Air Force Flying Training School at Malmen air base near Linköping might have created the world's most efficient military pilot training system — despite flying a very old platform in the Sk 60.

report and photos: **Dirk Jan de Ridder**

THE SWEDISH AIR Force (Flygvapnet) prides itself on being a compact — yet technologically advanced — air arm. Despite six squadrons of Saab JAS 39 Gripens to support it has a surprisingly low demand for new pilots from its indigenous training program. For this, the Swedish Air Force has been driven to rely on the venerable Sk 60 jet trainer — the Swedish designation for the Saab 105 — which has been in service for nearly 50 years and continues today with the Flygskolan (flying training school) at Linköping-Malmen.

As air forces around the world look for new advanced trainers to reduce the burden on operational conversion units (OCUs), minimizing flying hours on expensive combat aircraft and allowing new pilots to efficiently step through the training process, the Swedes too are looking at clever options in the face of tough financial conditions. It's the Swedish way of doing things.

The Flygskolan is organized into three flying squadrons. New pilots begin their practical education with 1. Division (1st Squadron), also known as the Grundläggande Flyg Utbildning (GFU, Basic Flying Training). The 1. Division syllabus comprises 125 flying hours, and lasts a year. Following this, students spend a while at the Air Force Academy in Stockholm, after which they return to 2. Division (2nd Squadron) or Grundläggande Taktisk Utbildning (GTU, Basic Tactical Training). This lasts for a further year and prepares the students for the big step to the Gripen OCU with F 7 Wing at Såtenäs. The third squadron is the only squadron not to fly the Sk 60, but is equipped with Agusta A109 helicopters for rotary-wing training.

A total of 150 Sk 60A side-by-side two-seat trainers entered Swedish service from 1966. Four years later, 46 of these were converted to Sk 60B standard, rendering them useful in the light-attack role via the addition of three hardpoints under each wing. The Sk 60Bs were fitted with a Ferranti F-105 Integrated Strike and Interception System (ISIS) weapons sight at Malmen.

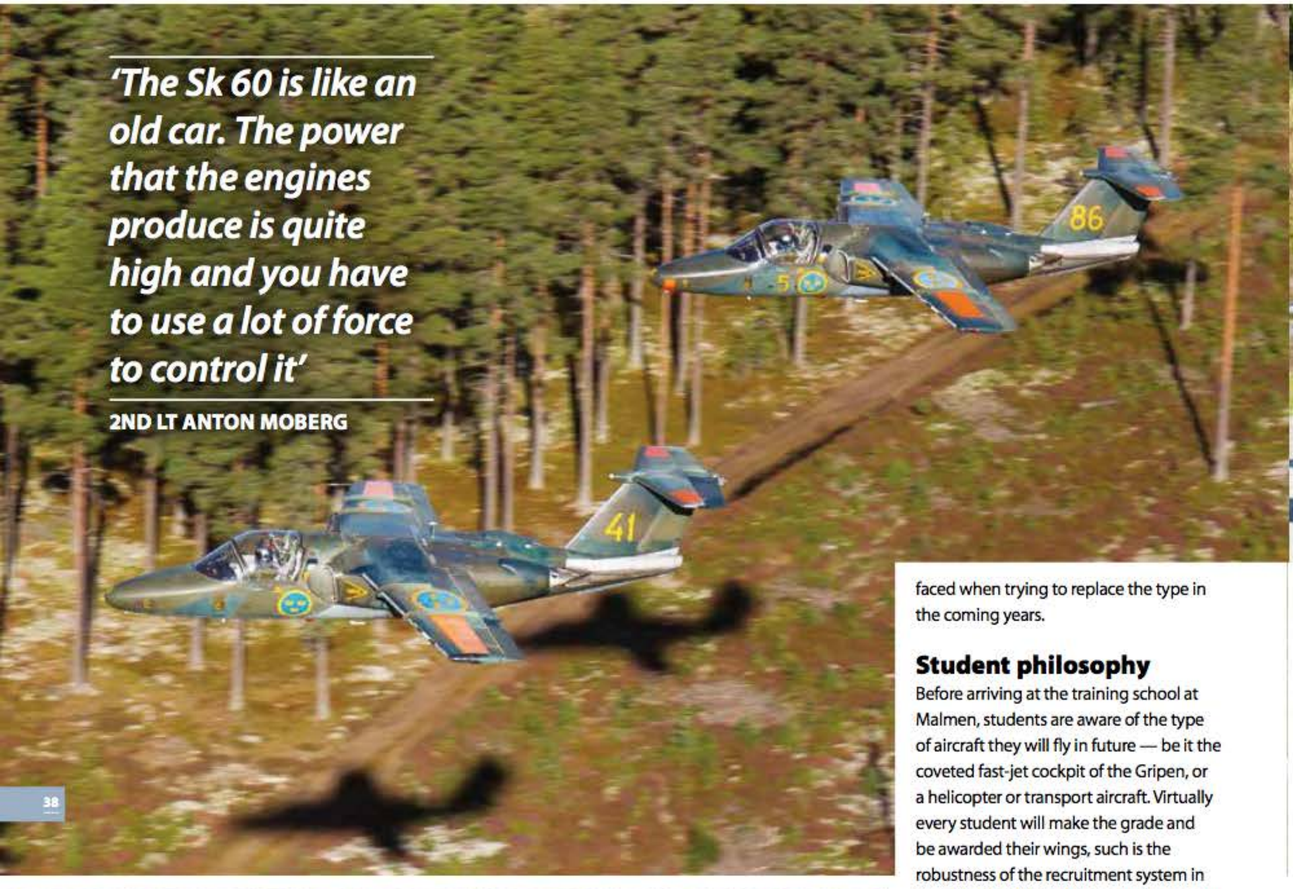
For light attack and weapons training, up to 12 Bofors 13.5cm unguided rockets could be carried, and provisions were also made for carriage of the Rb 05A command-guided missile, although the Sk 60 did not adopt this weapon for service. They were operational in this role until 1996, and around one third of the 'B' fleet remains in service today, albeit as pure trainers.

The Sk 60C was a further modified version, but with a lengthened nose to provide room for a panoramic reconnaissance camera. The Sk 60C is no longer in service as a training aircraft due to airflow problems during stall maneuvers, which proved difficult for students to manage.

While the Sk 60 is normally equipped with two side-by-side ejection seats, these can be exchanged with four fixed seats for liaison purposes.

Sweden's air force is one of the few that trains its new pilots in a jet from day one. Having completed the stringent selection process, the new pilot's first taste of flying is in the versatile Sk 60. They stay with this aircraft right through to the Gripen OCU — illustrating the tough task that will be


**Two-ship formation aerobatics forms part of basic flying training in Sweden, which is one of many aspects that make the Swedish system unique.**



*'The Sk 60 is like an old car. The power that the engines produce is quite high and you have to use a lot of force to control it'*

**2ND LT ANTON MOBERG**

faced when trying to replace the type in the coming years.

## Student philosophy

Before arriving at the training school at Malmen, students are aware of the type of aircraft they will fly in future — be it the coveted fast-jet cockpit of the Gripen, or a helicopter or transport aircraft. Virtually every student will make the grade and be awarded their wings, such is the robustness of the recruitment system in Sweden. Maj Michael Rosenquist, deputy commander of the Flying Training School and a former Gripen test pilot, says: 'We select our student pilots the same way as it's done in the US or any other country. However, here there is a critical difference, which is that when they are selected we believe in the selection process. They are selected to be able to handle the training.

'Every student's performance fluctuates over the course of a year', continues Maj Rosenquist, 'There are slow starters and there are fast learners. Following the old method we would have got rid of many good students that were among the best of the class, but performed below expectation at a point during training [yet successfully passed the flying course later]. I now don't have to check if they really fit in and I can focus 100 per cent on the training. We don't have check rides for example. In the end, everyone will be over the line of acceptable.'

The underlying thought process is that students perform better in a stress-free environment. Instead of vying for positions they are focusing on learning to fly as part of a team of students and instructors, rather than competing with classmates. Overall, this is known as the pedagogic philosophy.

Instructor pilot Maj Marcus Jedby says: 'My biggest responsibility here is to train the QFIs [qualified flying instructors]. We turn instructors into coaches rather than judges. That helps them to become as objective as they can possibly be. If we have a 'failed' sortie, it's as much a failure for the student as it is for the instructor. In other countries instructors just control [and check] things. I don't think you overcome problems that way — you just confirm them. Instead we focus on the learning process and we try to create an environment that is optimal for learning. As we see it, the student and the instructor are in it together and the goal is to get through it together.

'Our method has three pillars,' Maj Jedby continues. 'The relationship between student and instructor, communication and self-confidence. We try to build the students' self confidence as much as we can. It is scientifically proven that confidence makes for better learning and if you learn under stress you don't get a deep learning process. You always need some amount of pressure, but we check that they can manage under stress during their first five days during the selection process, so we don't have to check those things any more.'

Maj Jedby also explains a unique method they use to teach the new instructor pilots. 'During the last part of the QFI course we take volunteers from the street, generally with a connection to the Swedish Armed Forces, and the instructors are supposed to teach them how to fly in three weeks! We schedule some special sorties that we know will be confusing in terms of communication between the instructor and the student. That part of the education represents almost a whole year of experience [for the QFIs]. I am pretty convinced that's not done anywhere else in the world.'

One of the striking factors here is the ratio of instructors to students. 'We depend on having almost the same number of instructors as students', says Jedby, 'because the relationship is so important. When you know each other well, you don't have to grade and judge each sortie. It is impossible to use our system in a large air force such as the USAF. If you have 2,000 students and maybe 200 instructors you can't work like this. It is almost never the actual skill of flying that's the problem and we have a flexible syllabus. Of course you have to draw a line somewhere as we don't have unlimited resources, but we don't have a fixed line. It has never come to that point. We have washouts, but very few.'

## In the air

The experience gained by the Swedish Air Force when it comes to flying training in the Sk 60 means they've adapted to make the best of the type. Maj Rosenquist explains: 'Since it is kind of a special aircraft for basic flying training, students go solo quite late — after 30 hours. We don't have an elementary training or screening phase. With a basic propeller aircraft they would go solo after some 15 hours or so. This has to do with the speed and dynamics of the aircraft. When things go wrong, they go wrong faster with an aircraft like the Sk 60.

'It's easy to say the Sk 60 is the perfect solution for the Swedish Air Force, but we have adapted our training to the aircraft', explains Rosenquist. 'The side-by-side configuration has its advantages in the early stage of training. You gain a lot of information about the student by looking at them. Where are the hands, the feet, where is the student pilot looking, or how does he or she behave? There is a slight disadvantage in the later stage, because you are not sitting in the center of the aircraft, which means that during air-to-air training the visibility on the left or right is not optimal depending on what seat you're in.

'Two-ship formation aerobatics are part of our basic training syllabus and students also do it solo, which is not very common in basic training. That has to do with [the

Left page top to bottom: **When accompanied by an instructor, students get to fly as low as 70ft, but for a two-ship formation the minimum altitude is 170ft.**

**Two instructors walk back to the squadron after their sortie.**

Above: **A student performs pre-flight checks**

Right: **The Saab 105 is one of the last in-service jet trainers with a side-by-side cockpit configuration.**

fact that] we have a year and we will fill that year. Normally this would be on the advanced phase of the course. Advanced training also takes a year and the students operate the aircraft to the absolute limits. We currently have 12 guys on the advanced course. Four of them knew from day one that they will be transport pilots, so we don't take them as far in training. They will have an appetizer on the air-to-air role, but they will never go solo in the Sk 60'. Instead, they move to multi-engine training at Ljungbyhed.

The new Gripen pilots start air-to-air training once the transport pilots leave. 'There is some air-to-ground in the course', says Rosenquist, adding that the close air support phase on the Sk 60 has now been cut, as it doesn't provide relevant training for the Gripen. 'Every second year the class will go to Finland to take part in the final air-to-air exercise of the Finnish flying training school', says Rosenquist. 'We call it 'Red Flag for kids'. We also spend at least one week in the Gripen simulation center in Stockholm to give them a hint of what is coming. There they can fly a large mission in a Gripen environment.'

2nd Lt Anton Moberg, a student destined for the Gripen, was slightly unusual in that he had some experience prior to flying the Sk 60. 'I had 150 hours on the Cessna 172, so I had flown a little bit,' he says. 'The Sk 60 is more like an old car. The power that the engines produce is quite high and you have to use a lot of force to control it'. Asked about his favorite training to date, he says: 'I like to fly low-level navigation, because then you feel the speed and you have to work all the time. You fly with a map in one hand and the other hand on the stick, watching outside, looking for lakes and comparing [what you see] with the map. At the same time you have to look for birds and private pilots flying around, so you can't relax. The lowest we go with an instructor is 100ft or 70ft over the water. As a two-ship our minimum altitude is 170ft.'

## Supporting the Sk 60

A Saab contract to support the Sk 60 dating back to 2008 has now been extended to mid-2020 and the official Air Force stance is that the Sk 60 will soldier on until 2025. Saab provides operational support and maintenance services for the aircraft, which are still owned by the armed forces, which buys flight time from the contractor.

In addition, the Swedish Material Administration (FMV) awarded Saab an order worth SEK 130 million on September 21, 2009, to upgrade the Sk 60 fleet with new systems, including installing GPS, audible altitude and primary warning systems, plus the replacement of a number of older flight instruments. Following the modernization, the speed and altitude are displayed in knots and feet, rather than km/h and meters, in line with the Gripen C/D fleet.

In March 2014, Saab announced the signing of a memorandum of understanding with Pilatus to start planning to work together to provide a PC-21 training solution for the Swedish Air Force. Under the Military Flying Training System, this would provide up to 8,000 hours of basic and advanced flying training until 2040. In summer 2015 several candidates answered a request for information (RFI) containing 15 questions. However, with the extension of Sk 60 service to 2025 and with one eye on Saab's partnership with Boeing for the USAF T-X trainer competition, the situation is now less clear.

Maj Rosenquist has evaluated several trainers around the world. 'All of the work that has been done here has been used for the RFI. The main question is whether we should replace the Sk 60 with one aircraft or two aircraft. That is a big deal. Is there any kind of aircraft that can fulfill basic and advanced training? My guess is that it will be a two-aircraft solution. New avionics with a fighter-like cockpit is the big thing. There is not an enormous difference between a modern turboprop aircraft and a Saab 105 in terms of maximum speed, but [rather in] sustained Gs and high-altitude performance. Modern advanced trainers have excellent embedded training capabilities. For us it's all about simulated sensor information and simulated radar, at least for the advanced training aircraft if we go for a two-aircraft solution.'

In 2017, the Swedish Air Force said it was watching the T-X program. However, it's unclear how the cash-strapped Swedish Air Force, in the midst of acquiring the new Gripen E, could afford a high-end trainer like the Boeing/Saab T-X. Shortly before *Combat Aircraft* went to press, the Swedish Air Force released this statement.

'At this stage, the FMV will not define which manufacturers may be potential suppliers of a new trainer aircraft for the Swedish Air Force. The Swedish Armed Forces has developed requirements on an overall level about a new trainer system. In order to find more time and freedom of choice in this ongoing process the Sk 60 will continue to fly to 2025. Together, FMV and the Swedish Armed Forces are developing various trainer system concepts to find a suitable solution that fulfils the Swedish Air Force demands for future trainer aircraft that can replace the Sk 60.'


**Two Sk 60s flying over Lake Vättern near their home base.**