

"Total defense"—encompassing every citizen and designed to cope with any conceivable brand of aggression—is the policy of "alliance-free" Sweden. Modern airpower, backed by an orderly, virtually self-sufficient, and well-funded aerospace industry working in partnership with the government and armed forces, is a key factor in this nuclear-age posture . . .

Sweden's Air Force—Key to a Nation's Total Defense Posture

By **Stefan Geisenheyner**

AIR FORCE/SPACE DIGEST EDITOR FOR EUROPE

ALONG the dividing line between East and West that reaches from the North Cape on the Scandinavian peninsula to the Himalayas lie many countries. Of these, none can boast a more concentrated defense effort than that of the northern anchor, Sweden. For more than 150 years this country, with its present-day population of 7,500,000, has not been involved in a war and over the past century has pursued an alliance-free policy. Note that the phrase is "alliance-free" rather than "neutral." The meaning is clear—that Sweden is armed and ready to fight should anyone try to infringe on her rights.

To put muscle behind this philosophy, Sweden has evolved a unique integrated defense philosophy called total defense. This system makes effective use of every resource, without disturbing the economic growth and prosperity of the nation. Total defense is designed to meet effectively any possible form of attack, atomic or conventional, invasion by sea or by land, and offensive moves by aircraft or guided missiles. Even psychological and economic warfare have been taken into account.

This approach demands an unprecedented cooperation among the military services, the government, the industry, and, most important, the population. This effort moreover is supported by a sound and government-regulated military research-and-development and procurement program. No single factor in this total defense pattern can be reviewed properly without examining the other aspects of the integrated plan. For instance, in discussing the Swedish Air Force, the picture also includes the Department of Highways, which constructs roads so that jets can operate from them, including a chain of filling stations along the roads where the aircraft can draw their fuel in case of war, while the surrounding farmer population mans the anti-aircraft guns protecting these "airfields." Every male citizen between the ages of eighteen and forty-seven serves his country in case of war. Everybody, male or female, between the ages of sixteen to sixty-five, is called upon to serve in the civil defense organization. It becomes obvious that this necessarily static system makes sense only under the assumption that Sweden will never fight an offensive war. The armament and the structure of the Swedish forces accordingly preclude their use in anything more than a localized counterattack.

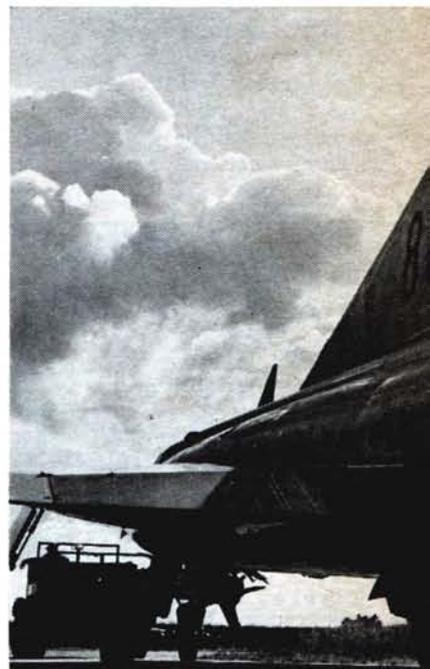
It is not Sweden's inhabitants, her mineral riches, nor her other resources that would be the prize and goal of an attack. Rather it is her strategic position on the Scan-

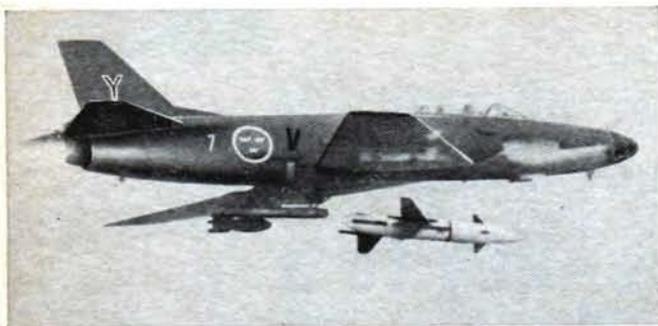
dinavian peninsula, which still could offer considerable tactical advantages to East or West. Therefore, both sides would spare no effort from the outbreak of a war to deny to the other the use of bases on Swedish soil. The NATO air-defense system reaches into Scandinavia to northern Norway and continues on to Iceland and Greenland. Farther south, the West has partial control of the area around the southwest Baltic Sea and the Baltic Narrows, which both border on Sweden. The West is therefore in a good position to bar the Soviet Air Force and Navy from the Atlantic area. The East in particular, but the West as well, could therefore gain considerable advantages if their respective military bases could be located on Swedish soil. For the West this would mean a completion of its defensive chain, and for the East access to the North Sea.

Sweden, for her own protection, must have a highly modern and effective defense system that discourages any possible attacker from the outset.

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In place on a country-road emergency strip, this Royal Swedish Air Force J-35 *Draken* interceptor, current mainstay of the Swedish air defense force structure, has a Mach 2-plus capability with up-to-date fire-control and detection hardware. The *Draken* is built in Sweden by SAAB, now an aerospace industry leader.





Attack squadrons of the RSAF are equipped with SAAB's all-weather A-32 Lansen fighter-bomber. Lansen's main armament consists of two to four RB-304 air-to-sea-target missiles, rocket-boosted torpedoes. Missile details are secret.

Fortunately great stretches of the borders that must be defended are purely Arctic landscape, strongly resembling northern Alaska. The geography and climate (the ten-month-long Arctic winter) greatly facilitate defense. Even if an aggressor has large forces at his disposal, the possibility of deploying them in great masses on the land fronts is slight due to inaccessible terrain and a very loosely woven road and rail net in the northern part of the country where an invasion by land could take place. This is one reason for the emphasis placed on a strong air force with extended reconnaissance facilities. The long coastal area and the relative nearness of the opposite shores facilitate timely warning of an impending invasion across the sea and from the air. In its present state of development, the Swedish Air Force is capable of inflicting extensive damage on any invasion fleet.

But Sweden's best defensive asset is her basic granite rock. Along the coast and in the interior, chain after chain of fortifications have been blasted into this rock, a work that was started during World War II and has continued ever since. Thousands of installations have been placed underground, ranging from small shelters to large staff headquarters. The government, the military regional commands, and civil defense headquarters have complete and extensive fortifications and bunkers deep in the rock at their disposal. Destroyers, submarines, and P T boats are kept invisible, well-protected, and ready for use in caves blasted out of coastal rock, while aircraft are poised for takeoff in underground hangers.

Since Sweden has no natural deposits of oil, great care has been taken to assure that fuel and lubricants will be available over a long period of time. Along the coast as well as inland, gigantic fuel tanks, sheltered from the effects of conventional or tactical atomic weapons, have been



A unique feature of the Swedish air defense system are road bases, especially strengthened sections of the nation's road network designed to serve as emergency wartime bases and flight strips. Above, a Lansen on such a road.

blasted out of the rock and are kept stocked for any emergency. Ammunition and other war supplies, in addition to food and clothing, also have been placed in such underground stockpiling areas. Future powerplants and industrial complexes are planned from the beginning to be built deep underground. Many such installations exist today and are in full operation even during peacetime. The Swedish aircraft industry—airframe, missile, engine and electronic factories—has been operating successfully for years deep under the granite of the Swedish mountains.

Nor has the civilian population been forgotten. In case of impending war, the inhabitants of big cities will be moved according to a precise evacuation plan. Those who must remain in the cities, and workers in the defense industry, have ample shelter space in the cities themselves. Again the invaluable granite serves as a protective cover, and the gigantic underground garages one sees in Stockholm, for instance, can be converted speedily into A-bomb refuges.

It is clear that such extended effort cannot be bought cheaply. The Swedish people foot a staggering defense bill, but judged by history these expenses have proved worthwhile. Few countries can boast that they have not been involved in a war for 150 years.

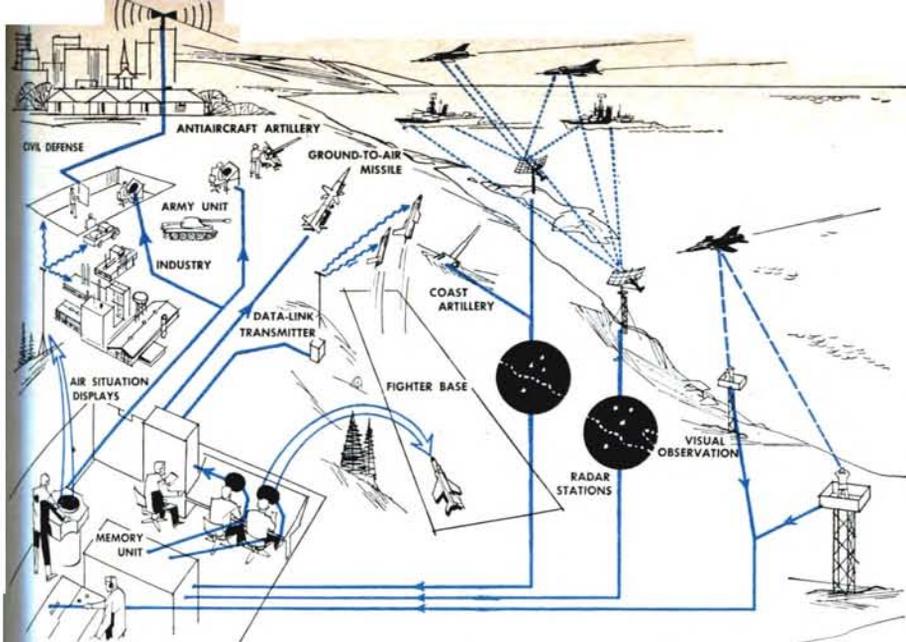
Military procurement policy assumes supreme importance in this country that pursues an alliance-free policy. Sweden cannot rely on any hand-me-down or military assistance program weapons. Everything acquired abroad has to be paid for in hard cash. In fact, few items are bought from foreign nations, as Sweden wants to depend on its own weaponry and moreover can safely do so. The Air Force in particular, which flies ninety percent domestic products, can boast some of the finest, most advanced aircraft and missiles in the world.

To manufacture equipment in small runs and to finance the necessary research for sophisticated weapon systems costs a lot of money. Sweden, therefore, buys weapons abroad when a small number is needed. Such purchases would include the British anti-aircraft missile Bloodhound or the ship-to-air missile Seacat which were bought in small quantities by the Swedish government direct from the manufacturer. The Swedes prefer, however, to acquire licenses to build and then modify weapons or engines to fit existing domestic weapon systems. Such was the case with the Rolls-Royce Avon jet engine and the Hughes Falcon missile, which serve as propulsion and armament respectively for the *Draken* all-weather fighter. Most weapons, however, are manufactured in Sweden, not because of false pride, but because in case of war manufacture can continue uninterrupted in the underground factories.

Five percent of the gross national product has been



Total of 130 SAAB A-60 close-support aircraft have been ordered by the Swedish AF, and an unspecified number of the two-engine counterinsurgency-type airplane are expected to be ordered later. Above, a missile-carrying A-60.



At left, a schematic chart of Sweden's STRIL/60 system. Radar stations collect information on the air and surface situation and the data are organized and deployed to operations controllers. They, in turn, select weapons to handle the reported situation and control the computer-guided weapons against selected targets. To complete the combat situation report, visual data, transmitted by radio and video channels, are fed into STRIL, maximizing the defense information input.

used annually to equip and maintain Sweden's armed forces. The GNP percentage rises sharply, however, if every defense expenditure such as strategic road construction or shelter building is added to it. The annual defense budget stands presently at approximately 3,500 million kronor (approximately \$700 million), thirty percent of which goes to the Army, ten to thirteen percent to the Navy, with the Air Force getting thirty-seven percent. The rest goes to other requirements of the total defense system. In spite of her heavy defense outlay, however, Sweden has the highest standard of living in Europe.

Since 1947, Air Force procurement has been based on so-called seven-year plans which are kept flexible to mesh with rapidly progressing technology. This system of procurement planning—which is strictly adhered to—has given the Swedish industry a healthy, enviable stability, which in turn is reflected in the high standard of equipment turned out by the manufacturers. Working under such a well-regulated procurement plan, which does not permit peaks and valleys, Swedish industry does not have to fear for its very existence because of changing government policy. Strikes or layoffs are unknown, and defense industry can rely on a highly trained work force of long-term employees, a factor which assures a top-quality product.

Based on this solid foundation of a stable government policy, a united population, and a capable industry that ensures self-reliance in nearly all aspects of weaponry, the Swedish Air Force today stands as one of the finest and most modern in the world.

The Swedish Air Force began in 1912 when the gov-

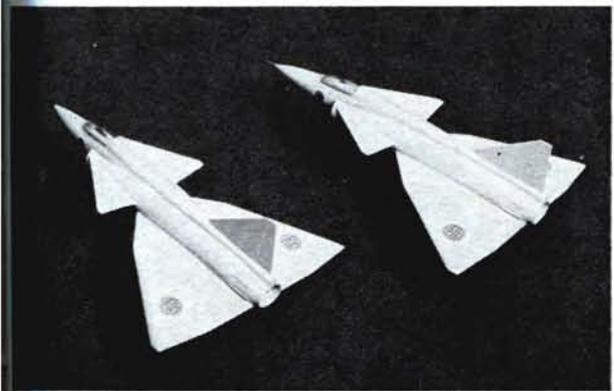
ernment allotted a sum for the aeronautical training of three officers, one NCO, and two mechanics. They trained in France. The same year the Swedish Army received its first two aircraft, one of which was a donation from the Swedish Aeronautical Society. In 1913 the Royal Swedish Navy started its own flying school with three aircraft. This modest beginning was followed by a rapid growth during World War I and culminated in the merging of the air arms of the Navy and Army to form the Royal Swedish Air Force. Thus in 1926 Sweden became one of the first nations to have an independent Air Force.

The advent of Hitler led in 1936 to a considerable increase in Air Force strength. Facilities for pilot training were expanded. The first experiences of World War II, however, showed that this organization and the equipment available were not sufficient to support the purposes of Swedish defense policy. In particular the experiences of the Finnish-Russian war in 1939-40, in which several Swedish Air Force volunteer units participated on the Finnish side, made an immediate change necessary. The Swedish government resolved that the organizational structure of the Air Force should be changed and a far greater number of aircraft be put into service.

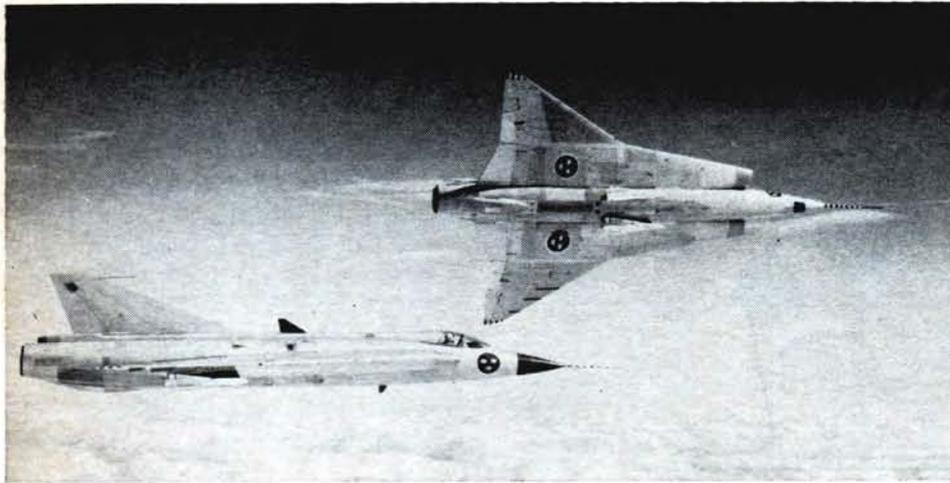
Since Sweden had bought, up to this date, nearly all its aircraft abroad, it had no domestic aircraft industry. The aeronautical firm SAAB (Svenska Aeroplan AB) had been founded some years before but it had contributed only meagerly to the equipping of the Swedish Air Force. Understandably enough, none of the great aircraft manufacturers of the world could sell aircraft to Sweden in 1940. The result was a rapid enlargement of the SAAB factories and the associated SFA (Svenska Flygmotor AB) engine factories. The Swedish aircraft industry was born. Towards the end of the war the Swedish Air Force was equipped with excellent fighters and bombers of domestic design. It was no mean achievement for such a small country to have founded and successfully operated an aircraft industry inside of four short years. In 1945 the Air Force numbered twenty-one fighter squadrons, twenty-one attack and nine reconnaissance squadrons, and had increased its training organization considerably.

The postwar euphoria did not take hold in Sweden. The lessons of unpreparedness had not been forgotten and moreover Sweden's borders were very close to those of the Soviet Union, whose expansionist policy was clearly recognized. War experiences led to another reevaluation of the Air Force organization, putting greater stress on the interceptor elements. In 1955 the Swedish Air Force con-

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Above, models of the A-37 Viggen under development at SAAB. Viggen would fly at Mach 2.5, have short takeoff and landing capability, and with the use of a bypass engine afterburner is expected by its designers to yield long range.



Showing its Swedish stuff, the Royal Swedish Air Force's *Draken* courses on patrol through Scandinavian skies. The delta-winged craft, shown here in its F configuration, carries two or four Hughes Falcon air-to-air missiles, which are built under license in Sweden. The F version is the latest of the *Draken* series, and its fire-control and radar are linked to RSAF STRIL/60.

sisted of thirty day-fighter squadrons, three night-fighter squadrons, twelve attack and five reconnaissance squadrons with adequate training units and installations. The flying school at Ljungbyhed, the air cadet school and the air staff college at Uppsala, several bombing and gunnery schools, NCO training and technical schools, and a radar and electronics school—to name the most important installations—formed the core of the training facilities. These schools are being constantly enlarged and modernized.

In 1960 Sweden was forced for budgetary reasons to reduce the number of aircraft in service, and five day-fighter squadrons were scratched from the inventory. This could be done safely since at that time a highly versatile weapon system, the SAAB J-35 *Draken*, began to be operational with the interceptor squadrons.

The Swedish Air Force at present is organized into four air groups, each of which is responsible for the defense of one part of the country. The equipment of the groups varies with their locations. The headquarters of the four attack wings of Air Group I, consisting of twelve squadrons, is at Göteborg, covering the southeastern and eastern access routes which lead over the sea to Sweden. Stationed at Ängelholm is the headquarters of Air Group II, consisting of three day-fighter wings and one all-weather wing with a total of eleven squadrons. The group protects the western flank of the Swedish peninsula toward the Baltic Narrows. Air Group III has four all-weather wings with fourteen squadrons at its disposal at Stockholm. Its task is day and night interception over the most densely populated regions of the country.

In the north, just below the polar circle at Lulea, is the home of Air Group IV which comprises one day-fighter wing, one reconnaissance wing, an additional reconnaissance squadron, and an all-weather fighter squadron, a total of nine squadrons. This group, with its heavy complement of reconnaissance aircraft, watches over the northern approaches to the country. Only aircraft can guard this frontier, where few roads are open from east to west during the short Arctic summer. The aircraft of the four groups are stationed at more than thirty peacetime bases, with at least double that number of secret wartime fields at their disposal. The only missile wing of the Swedish Air Force is located at Stockholm, equipped with Bloodhound II ground-to-air rockets of British design.

The number of aircraft Sweden can deploy for combat remains a secret. An educated guess would place it at approximately 1,000 to 1,200, thus making the Swedish Air Force one of the strongest on earth. A certain percentage of aircraft is obsolete or obsolescent, but this

does not hurt too much because of the Swedish defense philosophy and the resulting tactical situation. Swedish airpower is backed by one of the most sophisticated radar and surveillance nets in existence today. It carries the name STRIL/60. This surveillance system that, again, incorporates every aspect of defense—land, sea, air, civil defense, etc.—played a big role during the trial recently of Colonel Wennerström, the Swedish super-spy. He was alleged to have given away vital secrets of the system to the Russians. This indeed could be a bad blow to Sweden since all her defense effort is based on STRIL/60. A reorganization of the deployment of the four air groups, which is presently being conducted, may likewise have its roots in the Wennerström affair.

Basically the STRIL/60 system (as much as one can gather from the meager information available) is semi-automatic, with visual observation and other information fed in, and is comparable to the SAGE system. During the past year the first two sector centers became operational "somewhere in the south of Sweden." This year other sectors will follow. The sketch on page 39 shows what STRIL/60 will, or is supposed to, do. The Swedish Air Force will be able to fight under and out of an excellent radar screen. Even if some of the aircraft may not be the most modern anymore, the advantage of being placed by radar at the right time in the right location to meet an



Heirs to the tradition of Swedish airpower that go back as far as the days of Orville and Wilbur Wright, these Swedish AF officers are among the top-rated military flyers in the world. Above, they pose with the RSAF's *Draken*.

attacker under favorable conditions makes up for the couple of hundred knots that may be missing from maximum speed. Thus, STRIL/60 also becomes a typical element of total defense, since obviously it cannot be used in an offensive war.

Something should be said here about the men of the RSAF. In relation to the number of aircraft available, the manpower of the RSAF is ridiculously low—all in all, 12,550 officers, warrant officers, and men. An additional 6,750 civilians serve mostly in administrative capacities. This low manpower requirement naturally is a dividend of the total defense system, where air bases are kept operational by the highway department and do not have to be guarded, where the filling station attendant knows how to service an aircraft in time of need, and where the local television repairman takes the uniform out of his closet and drives to the nearby radar station to do some trouble-shooting. Defense in Sweden is everybody's business. Sweden has basically no standing army, just training units and an administrative skeleton, which is filled out in time of need by well-trained men. Only the Navy and the Air Force have a standing complement of servicemen.

In terms of equipment, the RSAF standards are high, perhaps the highest in Europe. The mainstay of the interceptor, all-weather, and reconnaissance squadrons is the single seat SAAB J-35 *Draken* (Dragon) in its different versions. This Mach 2-plus aircraft has been designed primarily to intercept bombers in the transonic and supersonic speed ranges. It carries the necessary radar equipment to operate under all-weather conditions. Its armament consists of automatic cannon and Sidewinder or Falcon missiles with the fire-control and radar systems directly linked to STRIL/60. A double delta wing makes it a most unusual and beautiful aircraft. It is powered by a license-built and modified Rolls-Royce Avon engine. The earlier *Draken* versions use the 200 series engine; the present models use the 300 series engine which delivers 16,000 lbs. of thrust with afterburner. The afterburner is of Swedish design, just as the engine has been modified to comply with the RSAF requirements. Presently the *Draken* J-35F version is in mass production. It is equipped with an advanced fire-control and radar system and will probably be the last model of the *Draken* series.

The attack wings are equipped with the transonic SAAB A-32 *Lansen* (Lance). This aircraft made its maiden flight in 1952 and became the first Swedish plane to pass the sound barrier, in 1953. This two-seater aircraft in the ten-ton weight class is powered by a license-built Rolls-Royce Avon engine without afterburner. The armament consists of four 20-mm. cannon, rockets, bombs, or missiles. The attack version of the *Lansen* is designed to operate under all-weather conditions over water. It carries the air-to-ship missile Robot 304, which probably is a type of rocket-boosted homing torpedo, the details of which are kept secret. A more powerful version of the *Lansen* A-32, the J-32B using the same Avon 200 engine with afterburner as the earlier models of the *Draken*, is used by two of the all-weather fighter wings. The aircraft is armed with Sidewinders, rockets, and cannon.

Three day-fighter wings still use the now-obsolete SAAB J-29C *Tunnan* (Barrel). In 1951 the fighter wings began to be equipped with the early versions of this aircraft, which had flown for the first time in 1948. It was the first sweptwing aircraft to be put into production in Europe and for its time probably was the best fighter in existence. It set two world speed records in 1954 and 1955, the latter record being remarkable because it was achieved by two service aircraft flying in formation. This aircraft is in the seven-ton weight class, powered by a de Havilland Ghost engine with afterburner. The armament includes four 20-mm. cannon, rockets, and bombs.

Aside from several types of training aircraft, helicop-

ters, and some foreign-bought Hawker Hunters which equip one wing, these three aircraft types make up the main strength of the Swedish Air Force. Maintenance problems and in particular spare parts difficulties are thereby kept at a minimum. The envisioned trend for the future, however, is even more ambitious. One single type is to fulfill nearly all the combat roles and requirements of the RSAF. This aircraft, which carries the name SAAB A-37 *Viggen* (Thunderbolt), is presently under development.

The *Viggen* multipurpose STOL combat aircraft is intended to initially replace the *Lansen* attack aircraft in 1969-70. Later on, the aircraft will be produced in reconnaissance and fighter versions, so that eventually all present combat aircraft can be replaced by this Mach 2.5 plane. This multipurpose capability will be made possible by developing the *Viggen* as a standard flying platform with characteristics and performance suited for all three combat roles. A digital computing center capable of easy reprogramming for the various tactical missions is seen as the heart of the weapon system. STOL performance will be achieved mainly through the use of a novel aerodynamic configuration consisting of a delta wing and canard wings with flap-blowing. The engine will be a Swedish modified supersonic version of the Pratt & Whitney JT-8-D bypass engine with afterburner and thrust reverser.

The *Viggen* program is said to be the greatest national project ever undertaken in Sweden, since the RSAF will require nearly 900 of the new aircraft to reequip the *Lansen* and *Draken* wings. The armament will consist of air-to-ground and air-to-air missiles of advanced Swedish-developed and -built types, besides the Rb. 304 torpedo. The close-quarter air-support duties will be fulfilled by a secondary type aircraft, the SAAB A-60. In the United States it would fall into the category of COIN aircraft. Originally designed as a trainer, this aircraft can be converted easily for ground-attack missions, armed with missiles, rockets, and cannon. SAAB has already received firm orders for 130 A-60s with an unspecified number to follow. These two programs alone will bring the combat strength of the Swedish Air Force to an unprecedented high level.

The Swedish people are aware that only a determined and steadfast effort on all fronts of defense can ensure the integrity of their homeland. In Sweden, defense of its freedom and independence is a common public goal and a gladly-accepted duty.—END

Last May, Stefan Geisenheyner, the author of this article, spoke before the Wiesbaden, Germany, Squadron of AFA on the Egyptian aircraft industry. Afterward, with perhaps a hint of coals to Newcastle, he was presented one of the traditional beer steins given all of the Squadron's guest speakers. Presentation was made by Robert Neely (at right in the photo), Past Commander of the Wiesbaden unit. On September 1, Mr. Geisenheyner joined the staff of AIR FORCE/SPACE DIGEST as Editor for Europe. He will work out of Wiesbaden for AF/SD as well as for the new AF/SD INTERNATIONAL, which will be distributed among leaders of the free world beginning in January 1965.



Mr. Geisenheyner, formerly Editor in Chief of Flugwelt, the leading West German aerospace magazine, wrote for AF/SD the article on the new Luftwaffe (March '64 issue) and the story of Europe's growing space program (July 64).