Krzysztof Kubiak

Swedish Armor 1920–1989

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KP AFV visible in the background,1960s (Arsenalen)

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Introduction

Geographical Features

It is impossible to discuss Swedish armor, even at the level of equipment, without explaining the main assumptions of the Swedish defense doctrine, itself greatly influenced by the country's geographical situation and natural conditions. At the very beginning, it is worth noting that Sweden is a fairly big country in Northern Europe, forming the eastern flank of the Scandinavian Peninsula. Within its borders lie Gotland, Öland, and many other coastal islands. With a total area of 173,732 square miles (449,964 sq km), Sweden is the fifty-fifth largest country in the world and fifth-largest in Europe. Its shape should not be left unmentioned: Sweden is visualized as the front paws, chest, body, stomach, and withers of what is known as the Scandinavian Lion. Sweden's longitudinal extent is 969 miles (1,560 km), running from the Smygehuk Lighthouse in the south to a tripoint between Norway, Sweden, and Finland in the north, and its latitudinal stretch is 255 miles (410 km) from a border crossing with Norway in the west between Ørje and Töcksfors to the eastern coast of the Gisslingö island. Sweden is an Arctic country, as about fifteen percent of its area lies within the Arctic Circle. On land, the Kingdom of Sweden borders with:

- Norway to the west: 1,006 miles (1,619 km) along a watershed in the Scandinavian mountain chain. (The highest mountain in Norway is Galdhøpiggen at 8,100 feet [2,469 m]; in Sweden, the highest mountain is Kebnekaise at 6,903 feet [2,104 m]; in Finland, it is Halti at 4,344 feet [1,324 m].);
- Finland (previously the Russian Empire) to the northeast: 364 miles (586 km) from the Three-Country Cairn tripoint at lake Goldajärvi (close to Kilpisjärvi), running along a small stream to Kuohkimajärvi, then along the Kuohkimajoki River to Kilpisjärvi, and by the Könkämäeno, Muonio, and Torne Rivers to Haparanda.[1]

Sweden has a maritime border, measured along the baseline[2] at 2,000 miles (3,218 km). The border is highly developed. There are approximately 222,000 islands and islets within the Swedish borders, and their area is 4,083 square miles (10,574 sq km, or 2.6 percent of the country's territory). The largest ones are Gotland (1,156 square miles [2,994 sq km] with a 426-mile [686 km] coastline), a particular challenge from the military point of view, and Öland (520 square miles [1,347 sq km] with a 308-mile [496 km] coastline). Gotland lies at a fifty-nine-mile [95 km] distance away from the shore, in the central part of the Baltic Sea. Öland stretches along the coast in the southern part of Sweden and is separated from the mainland by the Kalmar Strait, which

1 "The Swedish-Norwegian cross-border region," http://www.nordregio.se.

2 The baseline for measuring the breadth of the territorial sea is the low-water line along the coast as marked on large-scale charts officially recognized by the coastal State. (UN Convention on the Law of the Sea art. 5)

at its narrowest point measures three miles (5 km). A bridge crosses it there. The total length of the coastline, when counting the islands, is 37,780 miles (60,800 km).[3] Sweden shares territorial water borders with:

- Finland (previously the Russian Empire) in the Gulf of Bothnia, with a length of approximately 450 miles (725 km) and width ranging from fifty miles (80 km) in the Kvarken Strait up to 150 miles (240 km), and on the Sea of Åland (the distance between the Åland Islands and Sweden is about twenty-five miles [40 km]). Both water bodies usually freeze by the end of December and stay covered with ice until April. Despite the changing climate, during winter the Swedish Command has to take into account that the Gulf of Bothnia and Sea of Åland[4] do not form a water barrier in the classical sense of the term;
- Denmark through the Sound (connected by a bridge). The narrowest point of the strait is 2.7 miles (4.4 km).

The coasts of Estonia are separated from Sweden by 110–135 nautical miles (200–250 km) of water, the coasts of Latvia, by 145 nautical miles (270 km), but Gotland lies approximately 80 nautical miles (150 km) away from Latvia. Lithuania's coast lies 150 nautical miles (280 km) away from Sweden, and the distance between the Kaliningrad Oblast and Sweden is about 150 nautical miles (290 km). The smallest distance between Sweden and Poland is ninety nautical miles (170 km)—between the town of Ustka and the islands located south of Karlskrona. The German mainland coast is seventy-five nautical miles (140 km) away from Sweden, and the northern coast of Rügen is fifty-five nautical miles (100 km) away.[5]

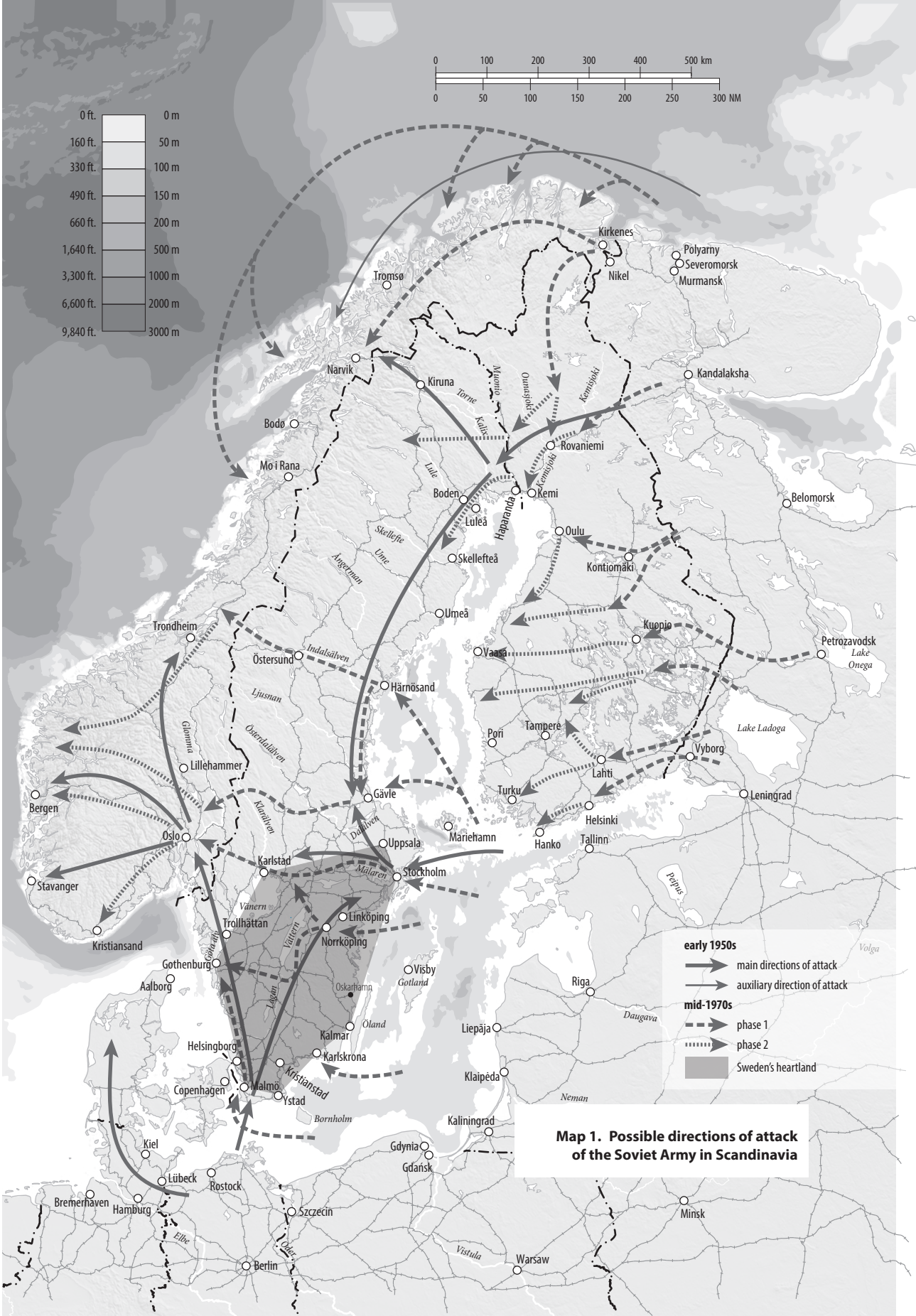
In relation to the area, Sweden is not a populous country. In 1939 it had 6.2 million inhabitants (currently ca. ten million). The majority of the population is of Swedish ethnicity. The largest minority group continues to be Finns, currently at 156,000 people.[6] The population is not evenly dis-

3 "Sweden Case Study Analysis of National Strategies for Sustainable Development," https://www.iisd.org.

4 As illustrated, for example, by the Russian Army's Ice Campaign conducted in March 1809 during the Finnish War. The Russian attack was planned by General Nikolay Kamensky: three Russian corps invaded Sweden. The Northern Corps (General Pavel Shuvalov, about 4,500 soldiers, eight cannons) crossed the Torne River and, moving south along the coast, conquered Kalix on March 13, 1809 (March 25 by the Old Style, or Julian calendar). The Central Corps (General Michael Andreas Barclay de Tolly, 3,500 soldiers, eight cannons) crossed the frozen Kvarken Strait and conquered Umeå on March 12, 1809 (March 24). The Southern Corps (General Pyotr Bagration, 15,000 soldiers, twenty cannons) marched on ice from Turku to the Åland Islands on February 26 (March 10). The Russians defeated a 6,000-man Swedish garrison and conquered the entire archipelago on March 6 (March 18). Around 2,000 men were taken captive and thirty cannons, as well as 150 different water vessels, were seized. On March 7 (March 19), the Russian advance guard under General Yakov Kulnev reached the Swedish coast and captured the town of Grisslehamn, located about forty-five miles (70 km) away from Stockholm. The Duke of Södermanland (later Charles XIII) proposed a truce. General Gotthard Johann von Knorring, the commander of the Russian forces, who was worried about Bagration's corps being cut off as a result of the ice melting, ordered the General to withdraw his forces to the initial position. However, a Russian garrison remained at the Åland Islands and Sweden never regained them. During the Finnish Civil War, 460 White troops led by the captain Johan Fabritius, previously driven out of the town of Uusikaupunki, made it across the ice to the Åland Islands on February 10, 1918.

5 According to nautical charts no. 495, 496, 497, 498, 499, 500, and 1501 issued by the Hydrographic Office of the Polish Navy.

6 "Sweden: People and Society," CIA World Factbook, last modified August 10, 2020, https://www.cia.gov/library/publications/the-world-factbook/geos/sw.html.



Map 1. Possible directions of attack of the Soviet Army in Scandinavia

GOTLAND: A UNIQUE CASE

Gotland is a key position in the central part of the Baltic Sea. Keeping an island means controlling the shipping and the air traffic. ELINT installations monitoring the activities of the Russian Navy and the Air Force are located on the eastern coast. The importance of Gotland has remained the same since the mid-nineteenth century (the era of Crimean War), when a British-French squadron was stationed there. The island was (and still is) an important asset as well as a very serious challenge for the Swedish defense system. (KK)

With an area of 1,156 square miles (2,994 sq km) and a coastline of 426 miles (686 km), Gotland is the largest island in Sweden and the Baltic Sea. It is a lowland island (its highest point—the Lojsta Heath—is elevated to only 272 feet [83 m]) with coniferous forests and meadows. It has 58,000 inhabitants and its largest city and capital is Visby, a city located on the western coast with a population of 23,000. Other larger towns include Slite (1,600 inhabitants), a port on the eastern coast, Hemse (1,900), Klintehamn (1,500), and Vibble (1,100). Off the northeastern coast lies the island of Fårö, with an area of 43.7 square miles (113.3 sq km), a coastline of sixty miles (97 km), and around 500 inhabitants. The Fårö Strait, separating the two islands, is an excellent anchoring ground, in the past used by the Swedish fleet (and during the Crimean War as an operating base by joint British-French forces in warfare against Russia, including an attack on the Åland Islands, which resulted in occupying the Bomarsund Fortress in August 1854). There is another island, twenty nautical miles (37 km) north of Fårö, called the Gotska Sandön (area: 14.11 square miles [36.54 sq km], coastline: sixteen miles [25 km]). Apart from the ports in Visby and Slite, Gotland has some thirty other harbors and marinas. There is an airport close to Visby, and the island has three additional highway airstrips (prepared to act as a field landing site). The coast is generally even, except for occasional cliffs on the southwest of Visby (Högklint). Gotland is about thirty-one miles (50 km) away from the mainland and eighty nautical miles (150 km) away from the coast of Latvia. Because of its central location on the Baltic Sea, holding Gotland means controlling the area where the Baltic becomes narrower and having control over the access to the ports of the Gulfs of Riga, Finland, and Bothnia, along with the southern and eastern parts of Sweden's coast. Gotland became part of the country in 1645, by the Treaty of Brömsebro. In 1676 Denmark took over it again, but the Swedes were back only three years later. The last enemy soldiers (the Russians during the Finnish War) showed up on the island in April 1808, but Sweden's swift reaction forced the invaders to surrender on May 18 of the same year. After the Crimean War, and especially between 1939 and 1945, Gotland was intensely fortified.

Combat vehicles have been stationed in Gotland since the 1930s. By the end of the Cold War, it had three full Strv 104 (locally modernized Centurions) battalions. On the one hand, this is an account of the role played by the island, but on the other hand, it can be explained by the fact that Gotland is one of the few places in Sweden suitable for the use of armor.

***Source*: Bengt Hammarhjelm, *Gotland under Kalla Kriget* (Stockholm: Svenskt militärhistoriskt bibliotek, 2015), 141–51; "Sweden: Gotland," last modified April 4, 2020, https://www.citypopulation.de/php/sweden-gotland.php.**

tributed: the largest centers are Metropolitan Stockholm, Malmö, and Gothenburg. A relatively large population density can be also found in the south of the country and in a lowland area adjacent to the Gulf of Bothnia. The inner part of Sweden is in many regions virtually uninhabited, except around Strömsund and Öresund in the central part of the interior, in the direction of the Norwegian city of Trondheim. These are the same regions where most of Sweden's industry is located.

Therefore, the following polygon must be considered a strategic core (heartland) of the country: the area between Gothenburg, Karlstad, Uppsala, Stockholm, Kalmar, Karlskrona, Ystad, and Malmö. The perimeter measures circa eight hundred miles (1,300 km) and is a uniform 35,000-square mile (90,000 sq km) area of land. It has a highly wooded glacial landform, with many ribbon and kettle lakes. A large lake system separates it from the northern part of the country. It is worth remembering that Stockholm lies on the edge of the heartland and is relatively unprotected by the lakes lying north of it. What is more, it is exposed to danger from the sea.

The climate of Sweden is varied—a feature caused by the country's large longitudinal extent. The southern part of Sweden has a temperate climate while the central and northern parts have a cold climate. Average temperatures are higher than at similar longitudes in different parts of the world (18°F [10°C] higher in January and 5°F [3°C] higher in July). This is owed to the North Atlantic Current (an extension of the Gulf Stream), as it warms up the air masses in Northern Europe, whose climate at the same time is being affected by westerlies. In January temperatures average from 32°F (0°C) in the south to 7°F (−14°C) in the north and the mountains, and in July they average from 59°F–63°F (15°C–17°C) to 50°F–52°F (10°C–11°C), respectively. Precipitation decreases from west to east, with an annual rainfall of forty inches (1,000 mm) in the south, ten to fifteen inches (300–400 mm) in the north, and sixty to seventy inches (1,500–1,700 mm) in the mountains (in some parts reaching eighty inches [2,000 mm]). In the part of Sweden lying within the Arctic Circle, midnight sun and polar nights can be observed—phenomena that influence the northern climate significantly. The sun shines around the clock from May 21 to July 24, and the opposite phenomenon occurs from December 2 to January 12.

Sweden is dominated by highlands: its average height of land above sea level is 906 feet (276 m). (Terrain height is distributed as follows: 25.7 percent of the surface does not exceed 330 feet [100 m] above sea level, 81.2 percent does not exceed 1,640 feet [500 m] above sea level, areas over 3,280 feet [1,000 m] above sea level make up 2.6 percent of the territory.) The highest point is Kebnekaise, a mountain lying in the north of the country, at 6,965 feet (2,123 m). The territory wanes from the Norwegian border toward the east. The Scandinavian mountains, situated in the west of Sweden, have extensive, flat peaks, called *fjels*. To the east, the mountains transition to the Norrland terrain situated at 1,300–2,300 feet (400–700 m) above sea level. In the south lie the Scania Peninsula and the domed South Swedish Highlands, the highest point of which stands at 1,237 feet (377 m) above sea level. In the northeast lie the Lappland Highlands; the Norrland terrain and the South Swedish Highlands are separated by the Central Swedish Lowland. The plains, running along the coastline, are Halland in the southwest, Kalmar in the southeast, and West Bothnia in the northeast.

Sweden is made up in sixty-four percent by forests, seven percent is arable land, and two percent are meadows and pastures—these numbers have been constant for several years. The country has urbanized, with cities growing mainly on barren land. Vegetation varies according to region: *fjels* and higher mountains are covered by alpine tundra (mosses, lichens, herbs, and dwarf shrubs) with a birch tree zone in lower areas. The upper limit of tree growth is 1,300–1,600

feet (400–500 m) above sea level in the north and 3,300–3,600 feet (1,000–1,100 m) above sea level in the south. Pine and spruce dominated taiga covers the largest stretches of the terrain. These forests grow in the Norrland terrain and the South Swedish Highlands. Among them, peatlands and sedge bogs can be found.

The rivers flow in the latitudinal direction from the Scandinavian mountains to the east and northeast. Along with the vast marsh and wetland tundra areas, they constitute significant operational barriers in case of an invasion from the north and slow down troop movements from the east through the Gulf of Bothnia and from the west through Norway. Lakes, which make up almost nine percent of Sweden's territory, can play a similar role.

Three main lake systems dot the country from west to east:

- The northern lake system, made up of Störsjön,[7] its adjacent lakes, and a river system;
- The central lake system, made up of the rivers Österdal and Vesterdal (which connect to form the Dal River) along with lakes and marshes;
- The southern lake system, stretching from Uddevalla to Stockholm, made up (from east to west) of the great lakes of Mälaren,[8] Hjälmaren,[9] Vättern,[10] and Vänern.[11] They distinctly separate the south from the rest of Sweden.

The central and southern systems play a key military role. The central system makes up the first frontier, and the southern system the main line of defense of the heartland. That means that the entire central part of Sweden and the north of the country, with its important iron ore mines near Kiruna (connected by rail with Luleå and Narvik), as well as Gotland, is outside of the heartland.

Areas suitable for the use of tanks (armor) in larger formations are at the western and southern edges of the heartland (south of the line traced by Ängelholm–Stehag–Lyby–Brösarp), in the northeast (in Uppland and Västmanland between the southern and central lake systems), and to a smaller extent along the line formed by Norrköping and Linköping. The only places in the north where armor can be employed are the narrow plains along the coast of the Gulf of Bothnia. The interior, from the Torne River southward, is a wetland of often marshy tundra that slowly transforms into a coniferous woodland crossed by ribbon lakes and swift-flowing bedrock streams. This significantly limits the possibility of operating not only with armor but with larger military groupings as well. It is safe to assume, without the risk of being mistaken, that wheeled transport outside of marked trails is simply impossible.

7 With an area of 179 square miles (464 sq km), Störsjön is Sweden's fifth-largest lake. The city of Östersund is located on its eastern shore.

8 Mälaren, with an area of 440 square miles (1,140 sq km), is Sweden's third-largest lake. Connected to the Baltic Sea and Lake Hjälmaren, it is actively used for sailing. Stockholm lies on its eastern shore. From the second half of 1940, the Polish submarines Ryś, Żbik, and Sęp were interned on Lake Mälaren. After being moved from Vaxholm, they were anchored close to the town of Mariefred, over which dominates the immense castle of Gripsholm (the exact location of the vessels was a bay between Förskär, an island now connected to land by a levee, and the Marielund narrow gauge station, lying close to the shore).

9 Hjälmaren is Sweden's fourth-largest lake with an area of 186 square miles (483 sq km).

10 Vättern is Sweden's second-largest lake with an area of 731 square miles (1,893 sq km).

11 Vänern is the largest lake in Sweden and the third-largest lake in Europe. With an area of 2,181 square miles (5,650 sq km), ninety-five miles (150 km) in length, and fifty miles (81 km) in width, it is genuinely a mediterranean sea.

Anti-tank terrain in Norrland (KK)

Terrain suitable for tanks in Scania (KK)

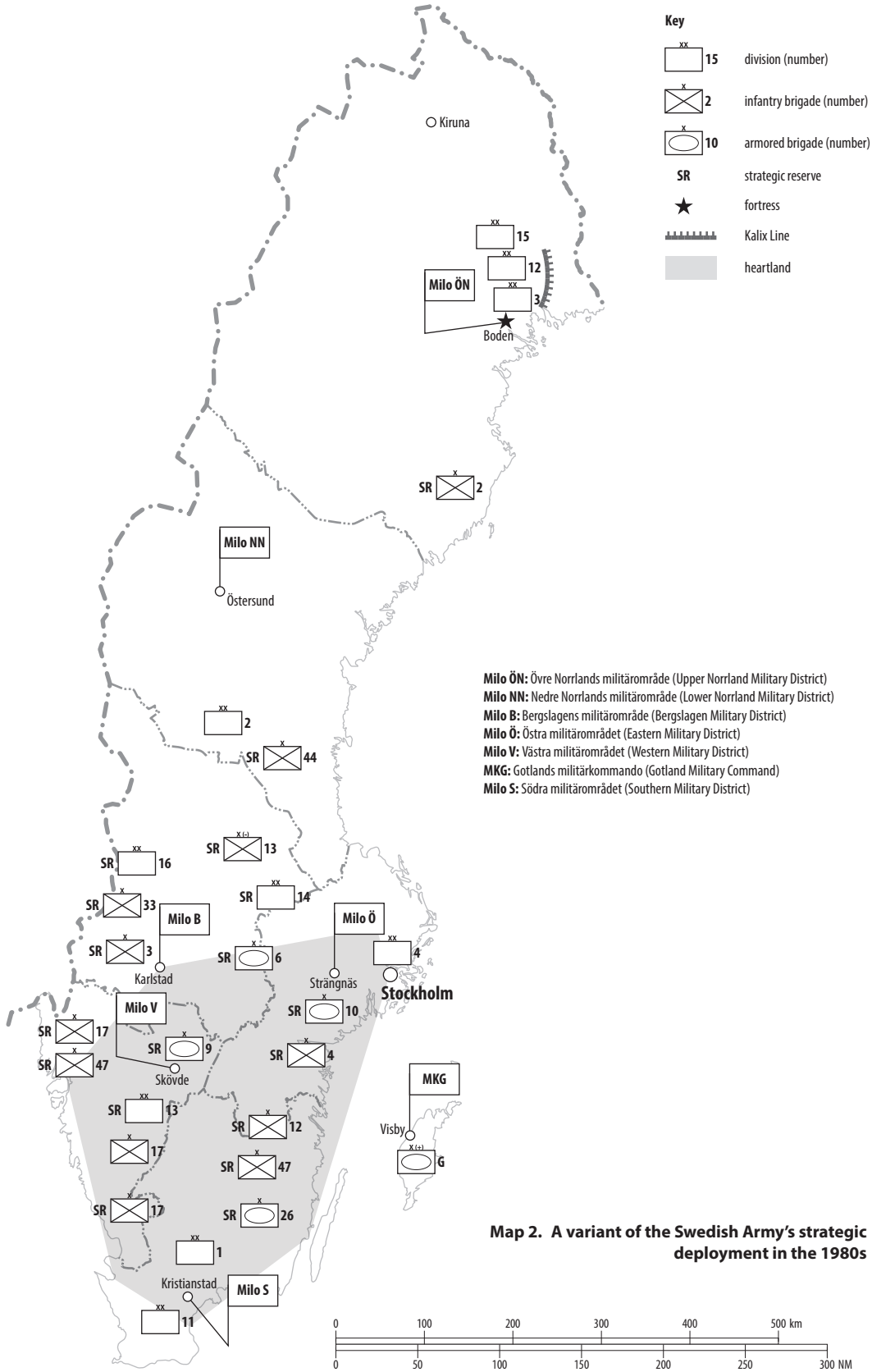
General Assumptions of the Swedish Defense Concept

The basis of the modern Swedish defense concept was formed at the end of the nineteenth century, but it resulted from the previous experience and the assessment of geographical features. When considering the potential military danger, in its defense planning Sweden had to take into account:[12]

- the southern (Jutland-Zealand) direction, with the Jutland Peninsula and Danish islands as a line of departure; encompassing southern Sweden with Malmö and Gothenburg;
- the central (Stockholm) direction, established by the possibility of using the Åland Islands as a line of departure, with potential auxiliary actions coming from the territory of Finland through the Finnish Bay;
- the Middle Bothnian direction, formed by a coastal plain line running along the Ljungan and Indal rivers from Sundsvall and Härnösand toward Östersund, later reaching (through the Scandinavian mountains) Trondheim, Norway.[13] This axis can be used not only in a western direction (after forcing the Gulf of Bothnia or succeeding at the central or northern direction) but also from the west to the east by forces operating from Norway, traversing the Scandinavian mountain passes, with initial positions in the Trondheim region; encompassing the Östersund area and Sundsvall. The enemy's success there means cutting Sweden in half;
- the northern direction, traced by the shape of coastal plains along the Gulf of Bothnia; encompassing the port of Luleå and Kiruna iron ore mines;
- Gotland, if attacked by sea.

12 Bengt Wallerfelt, *Den hemliga svenska krigsplanen* (Stockholm: Medströms Bokförlag, 2016), 90–93.

13 The Östersund-Trondheim axis was used in 1718/19 by the Swedish military in attacking Norway (which at the time was in a union with Denmark) during the Great Northern War. After failing against Russia (Charles XII was defeated in 1709 at Poltava and General Carl Gustav Armfeldt lost the Battle of Storkyro in Finland in 1714), the Swedish monarch decided to attack Denmark, the weaker opponent. At the end of August 1718, the army of 10,000 men led by General Armfeldt left the concentration area around Duved and marched toward Norway. The move was not successful, and on December 11, when Charles XII died during the Fredriksten siege, the Swedish forces in the south began to retreat. Armfeldt, who had approximately 6,000 men under his command, received the orders only on January 7, 1719, and decided to take the shortest route to Sweden, which led across the municipality of Tydal, then over the mountains and back to the fort of Hjerpe. It was freezing, but there was no snowfall. In good conditions, the army would walk the thirty-four-mile (55 km) distance in two days. The march began on January 12 and at first went according to the plan. Yet in the afternoon an intense blizzard struck, limiting visibility and drastically lowering the apparent temperature. Armfeldt decided to encamp at the Øyfjellet Lake, but there was no firewood. The day after, the blizzard continued. Soldiers burned sleds and musket stocks, but regardless of that about two hundred of them ended up losing their lives. In these dramatic circumstances, discipline was shattered and smaller groups of soldiers walked independently toward the border. The wind stopped on January 14, and the last of the remaining Swedes descended from the mountains two days later. By that time Armfeldt lost about 3,000 men and seven hundred more during a march to Duved, where quarters were prepared. Only six hundred men were left unharmed, and more than 1,500 suffered disabilities caused by frostbite. This episode was named the Carolean Death March. Cf. Anders Hansson, *Karolinernas dödsmarsch* (Östersund: Jämtlands läns museum, 2013). The convenient trail was fortified against invasion after Norway, having claimed its independence, blocked the way toward Trondheim. Around that time (1908–10) the so-called Hegra Fortress was built. On the other side of the border, the Swedes built fortifications in Klintaberg (between Hotagen and Valsjöbyn) in 1943/44.



Milo ÖN: Övre Norrlands militärområde (Upper Norrland Military District)
Milo NN: Nedre Norrlands militärområde (Lower Norrland Military District)
Milo B: Bergslagens militärområde (Bergslagen Military District)
Milo Ö: Östra militärområdet (Eastern Military District)
Milo V: Västra militärområdet (Western Military District)
MKG: Gotlands militärkommando (Gotland Military Command)
Milo S: Södra militärområdet (Southern Military District)

Map 2. A variant of the Swedish Army's strategic deployment in the 1980s

Warfare coming from the central and southern directions is considered to be the most dangerous, as it implies losing the heartland, i.e. the region with the highest population density and where most of the industry, as well as the political, financial, and cultural centers, along with the capital city, are located. Occupying the south of Sweden would mean decapitating the country and would make further resistance essentially futile. Such catastrophic consequences would not come either from losing the peripheral regions—the North and Gotland—or the Central Swedish Lowland, or even from cutting Sweden in half by forces operating from the west. These assumptions continue to be the basis of Swedish defense planning.

And so effectively protecting the south of the country remains crucial: successfully hindering a landing operation and maintaining the great lakes frontier. It is there that most of the large units and the majority of armored forces were stationed during the period discussed in this book. (In 1957 a battalion was placed in the north, and in the same year forces stationing in Gotland started transitioning to an armored combat group.) It was in the south that almost the entire navy (as well as coastal artillery) and the vast majority of the air force were placed. During the Second World War, the fortifications called the Per Albin Line were erected on the southern coast.[14] They were maintained in combat readiness until the end of the Cold War.

The Middle Bothnian area had coastal artillery placed on the island of Hemsö, whose role was to defend the island against an amphibious assault. The idea was to perform delaying operations with infantry forces and that is why no armored units were placed there.

Despite the north being far away from the heartland, Sweden would not give it up without a fight. Unlike the south, Norrbotten and Lappland would focus on delaying operations utilizing the Kalix Line.[15] In the Swedish north, what seems to be more important than having an armored mechanized "fist" are the following features: command adaptability, excellent knowledge of the

14 The Per Albin Line (The Skåne Line) is a fortification system erected during the Second World War along the southern coast of Sweden. It stretched from Båstad in the southwest, around the coast, and onto the middle of Blekinge. It was formed by a line of pillboxes with considerable defensive firepower. The construction started in 1939 with the erection of a coastal artillery battery close to Helsingborg. It was there that the rear battle position, protecting the first line against an attack coming from the land, was created. By the end of the war, in 1945, the line consisted of 1,063 different fortification objects. They were maintained and developed throughout the Cold War. The majority of them were destroyed at the turn of the twenty-first century, and only sixteen remain in the Helsingborg region. For more on the genesis and construction of the line, see Leif Högberg, *Skåne-Linjen (Per-Albin Linjen): Det skånska kustförsvaret under andra världskriget* (Skurup: Klippan, 2000).

15 The Kalix Line is a fortification system that was erected during the Second World War between the rivers Torne and Kalix and later maintained and strengthened during the Cold War. It stretched about eighty miles (130 km) toward the northwest from the Bothnian coast. It consisted of around 2,800 objects, the majority of which were either concrete-wood-earth infantry shelters or demolition chambers in bridges and levee trails. In the 1960s the line was strengthened with forts and batteries armed with guns from scrapped warships. The changes made were in Fort Siknäs (4×II 152,4 mm), Fort Häggmansberget (2×152,4 mm), Fort Miekojärvi (3×152,4 mm), Fort Parviainen (3×120 mm), Pajala Battery (3×120 mm), Tärendö Battery (3×120 mm), Junosuando Battery (3×120 mm), Vittangi Battery (3×120 mm), Gällivare Battery (6×120 mm), Vuollerim (1×II 152,4 mm), Harads Battery (1×II 152,4 mm and 3×152,4 mm), where in some armored cupolas the guns came from Drottning Victoria, Boden Battery (6×120mm), Norra Sunderbyn Battery (Druggaberget, 2×152,4mm), Luleå Battery (Hertsön, 3×152,4mm). In the eastern part of the line, some elements from the Boden Fortress were used. For more on the genesis and construction of the line, see Sten Ekman, *Kalixlinjen – kalla krigets lås i norr: Befästningarna, fasta artilleriet, de svenska planerna och det tänkta sovjetryska anfallet* (Stockholm: Svenskt Militärhistoriskt Bibliotek, 2013).

Pillboxes on the Per Albin Line, southern Scania (KK)

terrain and the ability to use it in combat, tactical mobility resulting from high marching ability (also on skis), the capacity of using available means of transport, a commander's initiative even at the lowest level, the individual soldier's forest warfare skills, and high motivation. It is for these reasons that the north got only two armored battalions.

In case of a high-intensity conflict, defending Gotland was considered to be a difficult or even a hopeless case. What was possible on the island was tying up enemy forces, as it is hard to imagine warfare in the central part of the Baltic without occupying or neutralizing the island. That is why a relatively strong garrison, whose core in 1957 became an armored brigade, was placed on the island. Its landform is suitable for this kind of warfare. But at the same time, the Gotland Brigade (Gotlandsbrigaden, MekB 18) has been the last to receive new equipment.

Structural Evolvement
1921–89

Sweden gained its first tanks as early as 1921. Those were ten German LK II light tanks, which initially came to be part of an experimental company set up in the Svea Life Guards (Svea livgarde, I 1),[1] a regiment[2] stationed in Stockholm. They were allocated there because one of the tank unit's tasks was to defend the Royal Palace (Kungliga slottet), the Parliament House (Riksdag) in the Stockholm district of Gamla Stan, and Rosenbad, the seat of government located across the Strömmen Bay, secure in case of large-scale social unrest.[3]

The Defense Act (Försvarsbeslut) of 1925 stated that a tank battalion composed of two companies would be established in the Göta Life Guards Regiment (Göta livgarde, I 2), stationed in Stockholm and Vaxholm. The new unit was formed in December 1927. Later, foreign equipment tests were performed there, thirty-five armored personnel carriers (thirty-four of which used civil truck chassis) were built, one tracked-and-wheeled tank, and two classic tracked ones were ordered. However, the army considered these actions to be purely experimental, and there was no plan to create or develop armored forces.

This was for a few reasons. First and foremost, the Great War had brought a fundamental and—as it seemed—permanent change in the safety architecture of the Baltic Sea Basin. Russia and Germany, former empires and the two key players in the Baltic region in 1914, had lost their ability to pose a real danger to Sweden. Russia was not only facing the aftermath of the revolution, a civil war, an Allied intervention in what used to be the Russian Empire, and a war with Poland but had also lost the majority of its coast. The newly independent Estonia and Latvia, and especially Finland, had become a buffer zone for the Three Crowns Kingdom. At the same time, Germany, disarmed after the Treaty of Versailles, was being cautiously observed by France in the west and checked in the east by Poland and partially Czechoslovakia, so militarily it had fallen to the third, maybe even fourth league. And when the Baltic region finally saw peace (three events symbolically contributed to it: the end of the Polish-Soviet war and the signing of the Peace of

1 It belonged to the King's Life and Household Troops (Kungl. Maj:ts Liv- och Hustrupper).

2 Just as in the British military nomenclature, a Swedish regiment is not a fighting unit, but a regional mobilization and training center that sets up battalions and other formations, which in war organization are incorporated into tactical units. After Sweden's army was reorganized into brigades, each regiment would be usually composed of two brigades, with an exception for Göta Life Guards (Göta livgarde), which was composed of three (IB 1, IB 31, IB 38). At present Swedish regiments set up battalion battle groups.

3 At the time it was the military's task to protect the monarch, parliament, and government. In the early twentieth century, law enforcement was managed by cities and rural communities. The first national Police Act was adopted in 1925, and the Swedish State Police (Statspolisen), a centralized organization, was established in 1932. However, the state and local police were not fully unified until 1965.

TYPE 49 ARMORED BRIGADE

- commander
- brigade staff (two heavy tanks, two KP APCs)
- tank battalion
  - battalion staff (one light tank, two heavy tanks, one KP APC)
  - reconnaissance platoon (five light tanks)
  - two light tank companies (thirty-one vehicles)
  - two heavy tank companies (twenty-six vehicles)
- two armored infantry battalions
  - battalion staff (two KP APCs)
  - two gunner companies (fourteen KP APCs)
  - support platoon (four KP APCs)
- special armored company (two heavy tanks, three light tanks, three fm/43 anti-aircraft vehicles)
  - anti-tank company (six m/43 self-propelled guns)
  - mortar company (twelve 120 mm m/41 mortars)
- artillery division
  - command battery
  - three batteries (four 105 mm howitzers each)
- anti-aircraft company (twelve 20 mm m/40 guns)
- engineer company
- repair and evacuation group (two light tanks, one heavy tank)

***Source*: Roth, *Försvar*, 63.**

So while the 1943 organization assumed forming *large* armored brigades, the 1949 one envisaged *small* brigades that would each have only one tank battalion and two infantry battalions, being more mechanized rather than armored and designed more for *blocking* than *breaking through*. Apart from the aforementioned organizational flaws of type 43 brigades (pansarbrigader m/43), among which was the blocking of roads during troop movements (while it was possible to set different lines of march, concentrating forces before entering battle became virtually impossible; the Napoleonian concept of "marching divided but fighting united" is not suited for Sweden's natural features), there was another reason for those changes. The amount of armor that the military had at its disposal did not drastically increase, nor did the manpower. So in forming six brigades instead of three, it was only natural that personnel and vehicles had to be redistributed from existing units. A KP armored personnel carrier deficit meant that brigade infantry would still partially travel on bicycles. Nevertheless, it seems fair to consider type 49 armored brigades (pansarbrigader m/49) as a step in the right direction, stemming from a more thorough consideration of the theatre of operations' natural features, which resulted from the verification, during military exercise, of the assumptions applied when preparing type 43 armored brigades (pansarbrigader m/43), and a realistic assessment of defense needs. A limited area of action for armored units excluded the possibility of large-scale maneuvers, and mobile units of the operational and tactical reserve were of utmost importance in the persistent defense which formed the core of the Swedish Armed Forces' strategy.

Type 49 infantry brigades (infanteribrigader m/49) were strengthened by armored companies of eleven or twelve vehicles. Depending on equipment availability, it was either m/38

TYPE 58 ARMORED BRIGADE

- commander
- brigade staff
- reconnaissance company
  - command section
  - two platoons with APCs
  - two platoons with off-road vehicles
  - support platoon
- three tank battalions
  - battalion staff and staff company
  - tank company
  - two armored infantry companies
  - support company
  - transport company
- support battalion
  - command platoon
  - support tank company
  - anti-tank company
  - two mortar companies
  - anti-aircraft company
- artillery division
  - command battery
  - three batteries
- engineer battalion
- logistics battalion

***Source*: Roth, *Försvar*, 66.**

or m/43 tanks and, in exceptional cases, Sav assault guns. Between 1949 and 1955, the military organized a total of forty tank and assault gun companies to directly support the infantry, and an armored group destined for military action in Gotland.[14]

The role of armor was viewed similarly throughout the entire period. Armored brigades continued to be the maneuver reserves of higher-level group commanders used for blocking breaches made in their own groupings and counter-attacking in favorable conditions. It should be stressed that all armored brigades were stationed within the country's heartland: the Seventh and Eighth in Scania, the Fifth and Ninth in Västergötland, and the Sixth and Tenth in the Mälaren region. So two armored units would protect the south of the country, and four would guard the great lakes frontier.

In the 1950s Sweden took on the challenge of putting its armored forces through modernization. It started with the military purchasing 240 Centurions with 84 mm guns (exactly 83.4 mm) from Great Britain and upgrading 225 m/42 tanks to the Strv 74 standard. The new equipment required adjusting the organizational structures. Yet before implementing the changes, Sweden had to streamline the mobilization and training support base of its armored forces. The Södermanland Armored Regiment (Södermanlands pansarregemente, P 3) was disbanded, and its tasks were taken over by the Göta Armored Life Guards (Göta pansarlivgarde, P 1). Simultaneously, the Norrbotten Armored Battalion (Norrbottens pansarbataljon, P 5) was formed in Boden. Its role was training and mobilization, and two armored battalions were to be set up on

14 Hans Nilsson, *Pansartruppskolorna 1942–1995* (Västervik: Probus, 2003), 55–57.

lands, covered with glacial erratics. The next reorganization saw the change of nomenclature: the six-machine platoons became self-propelled artillery companies, which remained equipped with six guns each. In the late 1950s, the vehicles received HEAT ammunition, which—at least in theory—made them capable of engaging in a fight with enemy tanks.[13]

The Ikv 72, 102, and 103 ended duty in the 1970s, but their chassis got a second life with the anti-tank Pansarvärnsrobotbandvagn 551 (Pvrbv 551) and Luftvärnsrobotbandvagn 701 (Lvrbv 701). Both of these machines will be described later. The Infanterikanonvagns were also the last fighting vehicles produced by Landsverk. Their replacement, the Ikv 91, would be made by a different manufacturer—Hägglunds, a company that also produced Pbv 302 carriers. The two designs were to a large extent unified to facilitate usage and reduce the cost of maintenance.[14]

Tanks Stridsvagn 81, 101, 102, and 104

Finding a solution to the problem of self-propelled guns did not, however, facilitate the issue with main battle tanks. Discussions and trials were being held following the established schedule, but they never led to anything conclusive. This was on the one hand because once again politicians had reduced military spending; on the other hand, aviation was now holding the status of the top military branch and thus most investments were geared toward its development. This shift was a Swedish way of solving the problem of having to protect an immense, yet sparsely populated territory.

The military was concordant in that the army needed two main classes of tanks. The first was a relatively heavy and well-armored one for working in the southern and eastern regions, where a road network had already been established and bridges could carry several dozen tons of weight. Secondly, a light tank for operating in the north was needed. Such a split was based on Sweden's geographical features and did not have much to do with the previous categorization of infantry and cavalry tanks. A candidate for the heavy tank was initially the British Comet (constructed still as a cruiser tank). Weighing slightly less than thirty-six tons (33 t) and armed with a superb 76.2 mm seventeen-pounder gun, it was an intriguing solution. The Comet was praised for the way its tracks dealt with difficult terrain, a feature acquired by reducing the pressure per unit area (partially as a result of experience gained in the Western Desert). Meanwhile, the military was also analyzing what the new British Centurion, a belated Second World War invention, could do. While the Comet was deeply rooted in the war and was only a quick upgrade of the Cromwell tank, the Centurion could be considered a methodical accumulation of almost the entire war experience.

Interestingly, American tanks were rejected right away. The M26 Pershing was judged too similar to the German Panther and showing little room for improvement; its successor, the M48 Patton, did not impress the Swedes either. For them, it was too weakly armed to face the Soviet IS-3, a tank that at the time seems to have caused a great sense of disquietude in the Swedish Military and its counterparts from other nations.

Thus Sweden had set its eyes on the Centurion, but the response from the British, received at the end of 1950, was discouraging. The latter claimed that shipping could start as late as 1958, since reequipping their own armored forces, as well as those of the Commonwealth, would be prioritized.

13 Ibid., 62–63.

14 "Infanterikanonvagn 72 / 102 / 103," last modified August 15, 2017, https://www.globalsecurity.org/military/world/europe/ikv-72.htm.

AMX 13 trialed in Sweden

This was inevitably intertwined with the ongoing Korean War, which at the time could have just as well become a global conflict, and during which the Centurions proved highly effective.

So the Swedes needed to look elsewhere. As mentioned earlier, the German Panther had not left them indifferent. However, a vehicle of that cost and technical advance was not within the Swedish Army's (due to financial reasons) or industry's reach (due to technical reasons). Next in line were the French AMX-13 light tanks, a promising combination of a German gun (its CN-75-50 a.k.a. SA50 was lineally connected to the KwK 42/70, the same gun that equipped the Panther) and high maneuverability. Since 1946 it was worked on in Ateliers de construction d'Issy-les-Moulineaux and designed to be a light tracked fighting vehicle that could be transported by planes and as such could be used by airborne support forces. Sweden recognized the need of having a vehicle of this class, and not because of its capacity of air transport, but because of the low carrying capacity of bridges and the state of roads in the north in North Bothnia, West Bothnia, and Lappland, which were running the risk of the Soviets attacking via Finland or northern Norway.[15] The military bought one AMX-13 in France and exhaustively tested it in the north in 1952/53. As it turned out, it had one significant drawback: the autoloader, which extracted ammunition from a five-shell magazine, not only needed to be refilled manually but also proved defective in low temperatures.[16]

15 In the north, Norway deployed forces that only gave slight coverage to the border. The first strong frontier of resistance was planned to be organized on the Lyngen Line, in the north of the province of Trøms, the same one that saw the organization of the main defense position of the German Twentieth Mountain Army retreating from the north. During the Cold War, in order not to directly refer to the German Lyngen Line (Lyngenlinjen), it received the name Frøy Line (Frøy-linjen).

16 The Indian Army faced the same problem during combat in the harsh high-altitude conditions in its war with China in 1962.

In 1952 the British reconsidered the Swedish proposal. The situation on the Korean Peninsula was stabilizing (the war had entered a trench and attrition phase), and the United Kingdom was facing a financial crisis. This had shed new light on the offer. Negotiations led to setting the price of one vehicle, along with a set of spare parts, at SEK 845,000 (this sum, at the then rate of exchange, equated to £50,000). The price also comprised two years of servicing. Already in November and December of 1952, Swedish experts paid a visit to Switzerland,[17] where they had the chance of acquainting themselves with the Centurion Mk 3. The head of the delegacy was the earlier mentioned Eric Gillner, at that time already a colonel.

The Swedish military establishment was now facing a difference of opinions on the subject of which tank was most suited for the local needs, and which type of fighting vehicles would be a better purchase for the army. The generals valued having both French and British vehicles, but this was impossible for obvious reasons, and a choice had to be made. The Chief of Army[18] Lieutenant General Carl August Ehrensvärd had a clear inclination toward the French vehicle, assessing the Centurion as *a very good tank, but too heavy for the Swedish conditions and too costly to maintain and use*.[19] In turn, the Supreme Commander[20] Lieutenant General Nils Swedlund was *skeptical whether France was at all capable of producing useful military equipment*.[21] Pronouncing his opinion, Swedlund was not just (at least not entirely) perpetuating stereotypes. Literature analysis makes it clear that his intention was getting a vehicle capable not only of surviving nuclear warfare but also of being confronted with Soviet vehicles—something the French light tank could not promise. He was drawing from a confidential report that had found a high risk of using tactical nuclear weapons in future wars, prepared in 1945 by the Swedish National Defense Research Institute (Försvarets forskningsanstalt, FOA).

The Supreme Commander was also striving to convince the Ministry of Defense of his point of view on the subject. At the time, the post was occupied by Torsten Nilsson, a *strong personality* in the Social Democratic party who had for many years been maintaining a secure political position.[22] His role and political significance allowed him to make decisions omitting tedious consultations. So in the end, without waiting for the Chief of Army's verdict nor that of the Royal Swedish Army Materiel Administration (Kungliga Arméförvaltningen, KAF), in the spring of

17 This country was also looking into acquiring new armor and had bought one tank, claiming that it had to check it on unique terrain. Switzerland ended up buying one hundred Mk 3 vehicles in 1955, locally designating them Panzer 55. Between 1957 and 1960, the Swiss bought one hundred more vehicles from Great Britain and another one hundred from South Africa. They were the Mk 7 tanks which served in the Swiss Army as the Panzer 57. In 150 of them, 105 mm L7A1 guns were later placed.

18 In the Swedish nomenclature, Arméchef (CA). It was not an operational commander's post. The Chief of Army's responsibility was looking over the army's functioning during peacetime and training and mobilizing subordinate forces. This post was renamed between 2002 and 2014 to Arméinspektör (Army Inspector). Currently, it is once again Arméchef.

19 Lindström and Svantesson, *Svenskt Pansar*, 65.

20 The highest operational commander, in Swedish Överbefälhavaren (ÖB).

21 Lindström and Svantesson, *Svenskt Pansar*, 65.

22 Torsten Nilsson first held the office of a minister (Minister of Communications) in Per Albin Hansson's government in 1945. Later, in 1951–57 he served as Minister of Defense, in 1957–62 as Minister of Health and Social Affairs, in 1962–69 as Minister for Foreign Affairs (in total, he served in seven cabinets of Tage Erlander); in 1969–71 he was Minister for Foreign Affairs during Olof Palme's first term as Prime Minister.

CONTROVERSY OVER BUYING CENTURIONS

Kranvagn/EMIL tank model

Torsten Nilsson's decision to purchase the British tanks stirred up controversy for many years and continues to do so today. For many, the minister "killed" the Swedish armor industry. During the Second World War, Landsverk prepared a few projects of tanks, whose production, because of the firm's limited potential, was never taken into consideration. After the war more projects appeared, including the Lansen tank, weighing nineteen tons (17 t) and armed with a 75 mm gun. It was supposed to be exported, which proved to be wishful thinking considering the number of surplus postwar machines available in the international markets. Between 1945 and 1946, Landsverk prepared another project, this time geared toward the domestic army: a thirty-three-ton (30 t) vehicle with a 105 mm gun. It was not accepted. So the company decided to go in a different direction, inspired by the French AMX-13 and its much larger clone AMX-50. The design of the new vehicle, concealed as Kranvagn (KRV, self-propelled crane) and code-named EMIL, started in 1951. It would have a 120 mm autoloaded gun, mounted on a turret. Most of the key elements of the new vehicle did not yet exist (including the automatically loaded guns), and other projects showed that making the components was a process lengthier than what the engineers had optimistically estimated. At a height of only 7 ft. 9 in. (2.35 m) and 150-200 mm armor in the turret's front part, its weight was not supposed to exceed thirty-three tons (30 t). This was possible only by reducing the front of the hull's armor to 70-120 mm; other parts of the machine would have an armor of only 20-30 mm. It should be noted that the army greatly contributed to extending the process of its designing, because it kept giving altering requirements to the producers. The main envisaged enemy of the new Swedish vehicle would be the T-34 and later, the panic-evoking IS-3. Changing concepts did not help to gain satisfactory results, so at the moment when the decision to buy the Centurions was made, there were only two Kranvagn chassis. The purchase of the British tanks meant the end of the Kranvagn project. The Kranvagn components were, however, used later on the Artillerikanonvagn 151 (eventually Bandkanon) self-propelled gun and the tank Stridsvagn 103. In 1958 a consortium consisting of Landsverk, Bofors, and Volvo tried to get back to the project when a new defense act was being negotiated, but their proposal was judged too expensive. The last attempt to save the KRV consisted of combining the Swedish chassis with a Centurion Mk10 turret. Work on the development of this project, designated Strv K, began in mid-June 1959. After contemplating the matter, the army rejected the offer. It was easier to buy new tanks than to make a hybrid, whose cost would exceed that of the Centurion Mk 10 by at least fifty percent.

***Source*: "Project EMIL: a summary," last modified December 7, 2013, http://tanks.mod16.org/2013/12/07/project-emil-a-summary/.**

One of the first Stridsvagn 81 tanks exercising in Scania, 1956 (Suneson, Carl Erik/Milimuseum)

1953, Nilsson informed the French that his country was no longer interested in purchasing the AMX-13. The French pride was highly dented by this, and not only because the country was losing a major—for a time of peace standard—contract for three to four hundred vehicles; France was being defeated by its age-old rival from across the English Channel.[23] Nevertheless, Nilsson's political strength was enough to buy only eighty vehicles, which could be seen as settling the matter, although—as it seems—not entirely.[24] To make up for the lost deal and to not lose a defense partner, Sweden made an order for the French 155 mm howitzers (Obusier de 155 mm Modèle 50).[25]

After the political decision of buying Centurions was made, things happened instantaneously. As early as May 6 (or May 2 according to some authors), 1953, the first batch of six brand new Centurions Mk III left the supply depots of the British Army and arrived in Landskrona. The city was not a random choice: it was there that Landsverk, the most experienced producer of armored vehicles—including tanks—in Sweden, had its factory. Furthermore, the city's harbor was equipped with cranes that allowed unloading heavy freight weighing around forty-five

23 Withdrawing from the negotiations was a task requiring awesome talent for diplomacy and had fallen on the head of the French commission, Eric Gillner, at the time still a prominent figure in the field of Swedish armor. Luckily, he knew the country well (Gillner held a degree from the School of Applied Artillery [École d'application de l'artillerie] in Fontainebleau, after studying there in 1932/33; he had also trained in a French artillery regiment). He was one of Sweden's most acknowledged experts on armor and motorization. He honorably retired in 1962 as Major General. Until 1974 he acted as a consultant for several companies in the arms industry; in this realm, he was an institution of his own.

24 Nilsson did not use up the entire budget. At first, the plan was to buy three hundred French tanks for SEK 210 million, and the final price that Sweden paid for the Centurions was SEK 67.6 million. This means that the Minister clearly decided to set aside a reserve in case there would ever be a need to revive the French offer.

25 Roth, *Försvar*, 63.

tons (40 t). The first Centurions were transported by *Silen*, a cargo ship owned by O.F. Ahlmark & Co. Eftr. AB from Karlstad.

The Centurion Mk III had a classic layout with the driver's compartment in the front, fighting compartment in the center topped with an electrically rotating turret, and engine compartment with the transmission system in the back. It had a torsion bar suspension with six pairs of road wheels, a drive sprocket in the back, an idler in the front, and four double return rollers. The 84 mm gun (Ordnance QF twenty-pounder with an elevation of –9° to +18°)[26] gave it high firepower (and an even higher one after adding sub-caliber APDS shells), and the armor of a maximum width of 150 mm gave it sufficient protection. It had a twelve-cylinder Rolls-Royce Meteor (it derived from the Merlin aero engine which propelled, among others, the Spitfire fighters) V engine with 650 horsepower and a displacement of 1,648 ci (27,000 cc). These last numbers are where the engine's flaw can be found: it devoured fuel, burning 2.5 gallons per mile (570 L per 100 km) on moderate terrain. This gave it a range of only seventy miles (110 km). A remedy was supposed to be equipping the vehicle with a single-wheel fuel trailer. This innovation weighed circa two tons, had a 10 mm armor, and could carry 240 gallons (900 L) of gasoline. On paper, it would increase the tank's range to 180 miles (290 km). The rules formulated for using this device stated that the tank should first pump fuel from the trailer; however, should the tank face the enemy, the trailer needed to be immediately unfastened and the range would shrink to its original value of seventy miles (110 km). Even so, the Centurion was so comfortable to handle that this alone was a giant breakthrough for the crew. What the Swedish Armored Forces also happily welcomed were mine flails, tailor-made for the tank, and a novelty for Swedish armor.

The first six tanks and two delivered slightly later were sent to the Second Armored Regiment in Hässleholm (P 2). They received the designation Stridsvagn 81 (Strv 81 in short; the 8 marks the tank's caliber in centimeters and 1 stands for the first such model in the Swedish Army). Intense training started right away. The task was particularly toilsome as it meant a complete switch from the archaic—when compared with the Centurion—Strv m/42 (its different versions). It is no surprise that the first companies were fully ready to take part in large-scale training only in the fall of 1954. The tank's debut was so impressive (though not capable of reaching great speed, it could traverse harsh terrain with ease) that the army decided to stick with the British option, and eventually funds were granted to buy another 160 tanks, this time based on the Mk 5 variant. These tanks had new fume extractors and an altered shape of the driver's visor cover. In total, Sweden bought 240 main battle tanks of the Mk 5 model, giving them the designation Strv 81. Yet the process of investing large sums on tanks was still marked by both Scandinavian frugality, and secrecy: the order excluded radios and interior communication systems. The domestically produced radios Ra 121, Ra 130, and Ra 400 were waiting to be installed in Hässleholm, and so were the interior communication systems with microphones for the entire crew (at first only the driver and commander had simple communicating devices).

Following the Defense Act of 1958, funds were set aside to pay the price of the new Centurions. The same year saw the beginning of negotiations with Great Britain, which was offering the Mk 5 variant with a twenty-pounder gun. The Swedes, however, aware of what modern technologies in the field of armored warfare were capable of, insisted on having the tanks armed with the

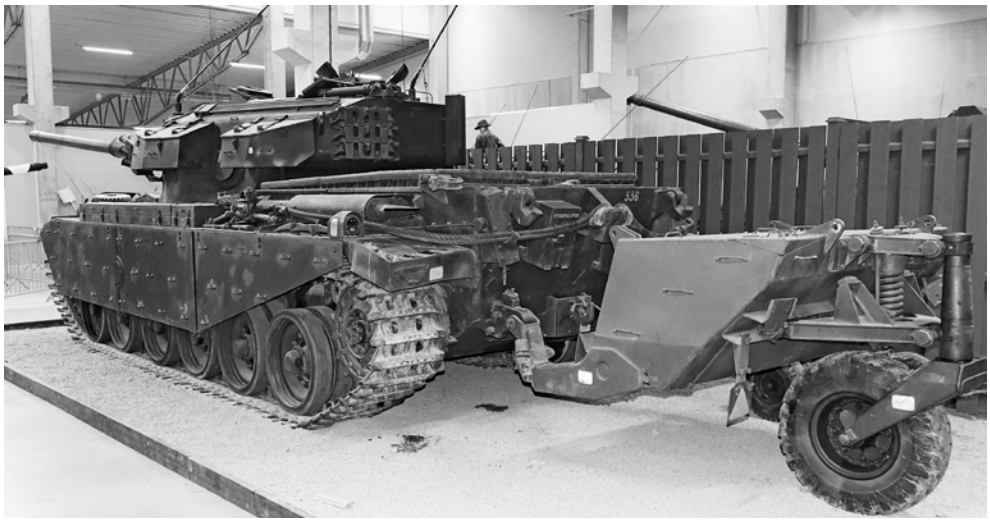
26 The gun's actual caliber was 3.307 in. (83.997 mm).

Strv 81 negotiating a water obstacle. The fume extractor is visible on the barrel, (Miliseum)

new 105 mm L7A1. At first unaware of the buyer's knowledge, the British eventually agreed to Sweden's terms and offered the Mk 10. Apart from the new gun and stabilization system, which helped to fire more precisely in motion, the turret now had a floor, facilitating the loader's work during its rotation. At the rear of the hull, the machines were given an extra fuel tank that increased their fuel capacity to 265 gallons (1,000 liters). Using the fuel trailer continued to be a possibility. The engine compartment now had a four-cylinder Morris A4 combustion engine with 11.5 horsepower at 2,500 crank revolutions per minute that powered an electric generator, and a fan that caused slight overpressure inside the vehicle. The front armor was thickened from 85 to 120 mm, the commander cupola was modernized, and the hatch above the driver's compartment was covered with double doors. (This guaranteed higher safety during observation, as one of the door wings covered the driver's face.) The tanks were produced according to Swedish standards, so the equipment was calibrated in the metric system. In total, 110 such vehicles arrived in Sweden where they were used with the military designation Strv 101.[27] It was superior to other Swedish Centurions in strength and accuracy of fire; it was also slightly better armored and had its range increased, which nonetheless remained hopelessly low.

Introducing the Strv 101 showed that the Strv 81 had to a great extent become technologically obsolete. But at the same time, its improvement potential remained large, and the Swedes gladly took advantage of it. Yet unlike Israel, which had truly perfected the art of modernizing British tanks, Sweden limited itself to changing only the gun and decided to keep the fuel-guzzling engine, leaving unsolved the problem of the vehicle's lack of autonomy. In 1964–1966, all 240 Strv 81 vehicles had their guns replaced in the Skövde and Hässleholm military workshops. Apart from the new

27 Lindström and Svantesson, *Svenskt Pansar*, 65–66.



Strv 101 with a fuel trailer, Arsenalen, Strängnäs (KK)

weapons, the vehicles were provided with Ra 421 radios (the Strv 101 also received them) and a new inner communication system, operated through a headset installed within the crew members' helmets.[28] After this upgrade, the tank was redesignated to Strv 102; in total, 110 modifications were made, from minuscule to large scale ones of varying complexity.[29] It was an ambitious, yet successfully run and speedily completed project. The armored forces' technical personnel had thus been able to quickly acquire new knowledge. All in all, the modernization, encompassing all vehicles, gave Sweden a fleet of 350 relatively modern main battle tanks, all sharing a similar standard.

Meanwhile, experiments of various types were being held. One of them was covering the armor plating with chains hanging from bars placed around the hull outside the tank's frame. Thanks to this solution HEAT warheads would be detonated prematurely, at a safe distance from the hull. However, as tests showed, the idea did not show promise, even though the Israeli Merkava tanks had a similar innovation introduced (although on a much smaller scale).

Despite not being extensively exploited, the tanks could not help becoming obsolete, and subsequent governments kept losing interest in buying new ones. The program of building a new main battle tank, referred to as Stridsvagn 2000, was developing very slowly and became eventually abandoned.[30]

28 Ibid., 66.

29 Alan K. Russell, *Czołgi i pojazdy wsparcia* (Warsaw: Bellona, 1996), 92.

30 It had already become obvious in the 1970s that the Armed Forces of Sweden would be needing new main battle tanks. In the Staff of Defense, the Inspector of the Swedish Armored Troops Björn Zickerman was able to push through his idea of not only building a light vehicle (which would eventually become the CV 90 family), but also a tank. The work was initiated in 1984, but it was stalled, partially because of the military, which—not for the first time—could not establish what it expected from the new machine. Most engaged in the process was HB Utveckling AB, a company co-owned by AB Bofors and AB Hägglunds & Söner. Several concepts with automatic and manned turrets were presented, but the military still could not decide which one would be the starting point for further research. No progress had been made until 1986, nor did the program gain enough momentum to survive the end of the Cold War.

Strv 101 during winter exercises on the Villingsberg proving ground, March 1, 1966 (Örebro Kuriren/Örebro läns museum)

Strv 102. Because of their tracks' construction, the Centurions quickly deteriorated road surface, generating considerable costs. A way to prevent it was creating the so-called tire commands, whose task was to place tire paths on the road. Strängnäs region, 1970s. (Arsenalen)

Instead, another upgrade, this time proposed by Bofors, was chosen. Between 1983 and 1987, it took place in Bofors's factory in Karlskoga, in the central part of southern Sweden. The process was named *torn-REMO* (*torn* means turret and *REMO* is short for *renovering och modifiering*, renovation and modernization). The work, apart from the servicing of the main mechanisms like the engine and suspension, consisted in upgrading the observation equipment and fire control system. The vehicles were fitted with night vision equipment, laser rangefinders (as part of the integrated gunner's sight, made by the company Ericsson), and a ballistics calculator. They also had the gun stabilizer improved. Two Lyran flare launchers (often erroneously called mortars) were added. As part of the renovation program, the older Strv 102 tanks had the front part of the armor thickened to match the level of the Strv 101. Both variants of vehicles had heat shields[31] installed on the barrels, which helped to slow down their deterioration. Fume-dispersing plates were placed on the exhaust system, reducing the vehicles' infrared signature. Another important improvement with the Swedish Centurions was provided by adding reactive armor plates in the front of the hull and on the turret. They were designed and produced by the local Förenade Fabriskverken works (Defense Industry Union, FFV).[32] The solution was based on the Israeli *blazer armor* (one of the participants in its production was the German engineer Manfred Held).[33] *Blazer armor* was introduced in Sweden only a few months after it had been first used in 1982 in combat in Lebanon. When considering how quickly the Swedes applied a new Israeli solution to their Centurions, the question of whether—or how—the two countries cooperated militarily arises, yet no information on the topic exists. In the Swedish variant, the *blazer* had two layers of steel, each 3 mm thick. Between the two layers was a 3 mm coating of explosives. But what must be observed is that the Swedish modules of reactive armor are much larger than the *bricks* used in Israel. After their upgrade, the cars received new designations: Strv 101R and Strv 102R, respectively. They were intended to be kept in service until 1995—Stockholm had thus given itself only a decade to solve the problem of a new main battle tank.

Meanwhile, the problem of the oldest, Strv 81 vehicles' deteriorating powertrain needed to be tackled. After the examination of their technical condition, eighty (twenty-four from the batch received in 1953 and fifty-six from the one dated to 1955) were selected among 102 most heavily used ones. An analysis of various possibilities was performed and once again the Israeli model was chosen. The Meteor carburetor engine was replaced with the American turbocharged diesel Continental V12, used in the M60 Patton with an Allison automatic transmission. Because at the same time Vickers was proposing its own 750-horsepower multifuel two-stroke Leyland L60 engine with a TN 12 transmission from Israel, comparison trials were conducted with the

31 Applying heat shields on the barrels limits barrel deformation, which otherwise occurs during firing, as the barrel becomes warmer than the air around it.

32 It was founded in 1943 as Försvarets fabriksverk (Defense Industry Works), as a result of the Royal Arms Industry Agency's (Kungliga krigsmaterielverket, KKV) decision to take over a rifle factory in Eskilstuna (Carl Gustafs stads gevärsfaktori), a powder mill in Åkers, an ammunition factory in Marieberg (Stockholm) and Zakrisdal (Karlstad), torpedo works in Motala, and other entities. Administered by the central government, first by the Ministry of Defense and later by the Ministry of Industry, it survived until 1991, when their inventory was partially sold to Volvo Aero Support AB, Telub AB, and Celsius Industrier AB, and the remaining part was absorbed by Bofors AB.

33 Florian Bouvenot, "The Legacy of Manfred Held with Critique," doctoral thesis, Naval Postgraduate School in Monterey, California, available also at https://calhoun.nps.edu/bitstream/handle/10945/25618/NPS-PH-11-005.pdf?sequence=1&isAllowed=y.

Israeli Centurion equipped with a Continental engine (the turretless hull was brought to Sweden as early as 1977 through Switzerland; the engine had come from the Netherlands, and the whole construction received the ingenious name Panturion). These tests proved the correctness of the solutions introduced. Modernizing eight, and later seventy-two Centurions was contracted to Hägglund & Söner AB in Örnsköldsvik. The work was concluded in 1987 and the vehicles included in it had also previously been a part of the *REMO* program. The newly designated Strv 104 remained in service until the early twenty-first century.

It was also only in 1987 that the problem of the low range was addressed. Caused by the fuel-guzzling Meteor engine, the issue was treated by the Israeli as so critical that in their Centurions they dealt with it before changing the gun. Moreover, the vehicles' improvement capacity was raised—replacing the engine could take place in the field and would now last only a few hours, whereas before the vehicle would have to be placed in a shop for at least three days. Additionally, it could now reach a higher speed. One of the still remaining drawbacks was the engine compartment lacking space for an auxiliary power unit, i.e. the one that could produce electricity at a standstill. Therefore, to provide electricity, the engine had to idle. The Panturion differed from the vehicles with Meteor engines in the shape of the air inlets above the engine compartment. It also had the reactive armor blocks exchanged for smaller ones.

As no verdict was announced regarding the new main battle tank, preparations were made for a second upgrade of the Centurions—this time referred to as *REMO 2*. A new prototype, designated Strv 105, was even developed. It had a diesel powerpack and a new transmission system, a deeply modernized suspension, new hatches, a better configuration of the turret floor, new observation equipment including the freshly introduced passive night vision devices, modernized ballistics calculators, more precisely balanced barrels, a new ammunition frame designed for longer projectiles, and matte camouflage. Experiments, conducted in 1991–1993, proved successful. But it was too late for such a venture; the Cold War had ended and Sweden had the possibility of acquiring second-hand Leopard 2 tanks from a Bundeswehr surplus. The Swedish military took advantage of it and began the process of a gradual withdrawal of the Centurions, which, in the case of the Strv 104 in Gotland, would last until 2001.

It should be pointed out that after the fall of the Berlin Wall and reunification of Germany, Sweden bought KMT 5[34] mine-clearing devices from what was left after the Volksarmee, whose new designations became Minvält 1. The Strv 102/104 and Strv 103[35] tanks were adapted to operate them. This was the first time this kind of device became a part of the Swedish military's equipment.

The 240 first Centurions were sent to four armored brigades type 58, each of them having forty-eight tanks. But after the 1963 reorganization, armored brigades had seventy-two tanks.[36]

34 The mine clearer detonates or removes land mines, clearing the tank's path. Weight: 8.3 tons (7.5 t), clearance width: 2×3 ft. 3 in. (2×0.81), clearance depth: 4 in. (0.1 m), mount time: approx. forty-five minutes, removal time: fifteen minutes, tank speed with flail: four to eight miles per hour (6–12 kmph), tank speed with flail according to the Swedish manual: five miles per hour (8 kmph). It is worth noting that the pressing sections could be removed by using explosive cartridges. In this configuration, the tank only had digging sections.

35 Försvarets Materielverk, "Minvält 1: instruktionsbok Strv Centurion, Strv 103," manual (Stockholm, 1993).

36 Bo Hugemark, ed, *Den stora invasionen* (Stockholm: Medströms Bokförlag, 2017), 146.

Strv 104, Gotlands Försvarsmuseum (KK)

Swedish reactive armor, here on an Strv 104, Arsenalen, Strängnäs (KK)

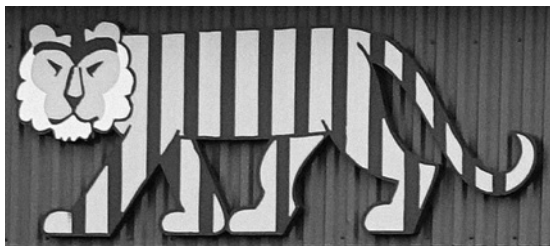
Table 16. Strv 81, 101, 102, and 104 tank: specifications

Variant	Strv 81	Strv 101	Strv 102	Strv 104
Combat weight [tn. (t)]	55 (50)	58 (52)	55 (50)	60 (54)
Hull length [ft. (m)]	24'9" (7.55)	24'11" (7.60)	24'9" (7.55)	24'9" (7.55)
Total length* [ft. (m)]	31'7" (9.62)	32'4" (9.85)	31'7" (9.62)	
Width [ft. (m)]	11'1" (3.37)	11'2" (3.40)	11'1" (3.37)	11'1" (3.37)
Height [ft. (m)]	9'8" (2.94)	9'10" (3)	9'8" (2.94)	11'1" (3.37)
Clearance [ft. (m)]	1'6" (0.46)			
Engine	carburetor Rolls-Royce Meteor MK 4B			Diesel Continental V12
Engine power [hp]	650			750
Transmission system	Merrit-Brown Z51R Mk F			Allison
Maximum speed [mph (kmph)]	22 (35)			28 (45)
Range [mi. (km)]	70 (110)			190 (300)
Armor (turret front/hull front/ hull sides) [mm]	150/85/51	150/120/51		150/120/51 and reactive armor
Radio	Ra 400 (for communicating with the company network on two frequencies); Ra 121 (for communicating with the battalion network); Ra 130 (for communicating with the infantry)			2×Ra 121, 1×Ra 421
Main armament	84 mm gun†	105 mm gun		
Rate of fire	8–10 RPM	8–10 RPM		
Ammunition stock	65	69 shells (30 high-explosive, 39 anti-tank)		
Secondary armament‡	8 mm Ksp m/39 machine gun 2×VI 51 mm smoke grenade launcher	7.62 mm Ksp/58B machine gun 2×VI 51 mm smoke grenade launcher		
Ammunition stock	4,750 (19 belts with 250 rounds) 42 grenades			
Off-road capabilities	climbing 60° inclinations tipped at 30° and 11 ft. 2 in. (3.4 m) wide trenches, overcoming vertical obstacles of 3 ft. 3 in. (1.0 m), and fording water 9 ft. 9 in. (1.45 m) deep			
Crew	4 (commander, loader, gunner, driver)			

*with the fuel trailer it was 9 ft. 10 in. (3 m) longer; †the actual caliber is 83.4 mm; ‡in R and 104 variants also a 2×71 mm illumination shell launcher (with six to twelve missiles)

Author's elaboration based on: Lindström and Svantesson, *Svenskt Pansar*, 64; Russell, *Czołgi*, 94–95; information from Hässleholms Museum.

Appendix K. The Swedish Tiger



The Swedish Tiger on a hangar in Beredskapsmuseet, Djuramossavägen (KK)

The threat of war required a new symbol of national unity in Sweden. But Swedish social-psychology specialists did not want it to be too puffed-up and refer to the Carolean era, warrior kings, three crowns, or withy (in the House of Vasa coat of arms). From this came a character, whose origin is… a comic book. The Swedish Tiger (En svensk tiger) was a new symbol of Swedish war readiness: the predator, instead of having its natural color, was depicted with yellow-blue or golden-blue stripes. The creature looked more friendly than threatening, and met with almost universal acceptance, becoming a leading motif of the information and propaganda campaign intended to convince Swedish citizens to restrain from sharing key information on state security (Vaksamhetskampanjen, Swedish Vigilance Campaign). The idea was based on wordplay: the word *tiger* in Swedish, apart from referring to the wild cat, can also mean (*he or she) remains quiet*. Thus the sentence *En svensk tiger* can be understood both as *A Swedish tiger* or *A Swede keeps their mouth shut*. The tiger was created by the illustrator and children's books author Allan Bertil Almqvist (1902–1972; also known under the pennames of Bertil and Trall-Göken), who had a contract with the National Board of Information (Statens Informationsstyrelse). The tiger, borrowed by the Swedish State for a one-time campaign, quickly became a new symbol for the armed forces. A legal dispute followed this appropriation and as its result, the Military Readiness Museum (Beredskapsmuseet), which owned the copyright after the bequest of Almqvist's inheritor (his daughter), the Army had to pay a SEK 700,000 fine. This ruling came only in the second instance, as after the first it was decided that using a symbol as military propaganda did not count as copyright infringement.

***Source*: "En Svensk Tiger," accessed January 15, 2020, http://www.beredskapsmuseet.com/en-svensk-tiger/; "Szwedzki tygrys," last modified May 2, 2007, http://szwecja.net/NOW/ArchiwumNowin/2007/070502-tiger.shtml.**

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Museum Collections

Gränsförsvarsmuseum Abisko
Arménuseum in Stockholm
Arsenalen in Strängnäs
Artillerimuseet in Kristianstad
Deutsches Panzermuseum in Munster
Försvarsmuseum in Boden
Hässleholms Museum
Marcus Wallenberg Hall in Södertälje
Panssarimuseo in Parola
Robotmuseum in Arboga
Teknikland in Östersund
Volvo Museum in Gothenburg