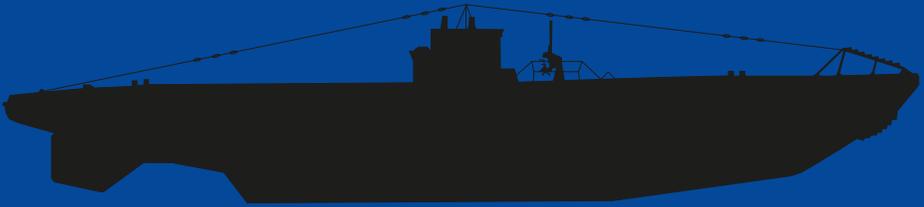


Markku Melkko



SUBMARINE VESIKKO

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Early stages of Vesikko

During the first years of Finland's independence, the Finnish Navy consisted of vessels Russians left in Finland in 1918 and partly outdated vessels. The Naval Act approved by the Finnish Parliament in 1927 enabled funding for a ship-building programme, as a result of which armoured ships Väänämöinen and Ilmarinen, four motorised torpedo boats and submarines Vetehinen, Vesihäisi, Iku-Turso and Saukko¹ were built at Finnish shipyards between 1928 and 1931.

Because Finland did not have the know-how required to build submarines, Finland turned to other countries, with Germany in particular having extensive experience in the design and construction of



The Vetehinen class submarines and Vesikko were built at the Crichton-Vulcan shipyard on the east bank of the River Aura in Turku.

submarines during World War I. The Treaty of Versailles of 1919 banned Germany from having submarines. As a result, it had moved its submarine design activities to the Netherlands by establishing a ship-building office (IvS) in the Hague. The office that designed and supervised the construction of submarines, for example, for Spain, Sweden and the Soviet Union was also selected to design and supervise submarines built for Finland. The aim of the German Navy Command was to build a submarine fleet, consisting of 700–900-ton and 250-ton submarines. The Germans had already gained experience in larger vessels from other countries, but not yet in 250-ton submarines.²



CV-707 undergoing trials at the submarine school of the German Navy in summer 1934.

The Crichton-Vulcan shipyard in Turku was finishing the Vetehinen class designed by IvS in 1930, and the testing of the first submarine was completed with success in October 1930. The Germans were impressed by the quality of the shipyard and, after receiving the appropriation of 1.5 million Reichsmarks, they signed an agreement with Crichton-Vulcan on the construction of a 250-ton vessel on 9 October 1930. On 7 March 1931, the shipyard agreed upon the terms and conditions of construction with the Finnish Government. Accordingly, Finland reserved the right to acquire the vessel until the end of 1937, and the Ministry of Defence supervised the construction and testing of the vessel. The vessel was named CV-707 after the shipyard order number and its keel was laid on 1 August 1931.

The vessel, which was of a completely new design, was built slowly and was finally launched on 10 May 1933. The test runs of the vessel were carried out in summer 1933 by students of a submarine course run by the German Navy and these were monitored by engineer commander Jaakko Rahola on behalf of the Finnish Government. The German commander of the vessel was former submarine officer Werner Fürbinger, followed by Robert Bräutigam. The trials were a resounding success. When submerged, the vessel was very easy to manoeuvre at different speeds, both forwards and backwards. When all three torpedoes were fired at the same time, the vessel rose about two metres, while remaining fully submerged. The vessel's maximum speed when submerged was eight knots. On the surface, the vessel was seaworthy and its maximum speed was 13 knots. In Germany, CV-707 was accepted as a prototype for upcoming vessels. Accordingly, six II A class vessels were later built at the Deutsche Werke shipyard in Kiel for the German Navy.³

By the middle of September 1933, the trials of the vessel were completed. The Finnish Government was now able to acquire CV-707, but there were difficulties in obtaining financing, and the vessel remained under the ownership of Crichton-Vulcan. In summer 1934,



Vesikko still bears the name CV-707, but is already flying the Finnish war flag in Suomenlinna in summer 1935.



The Finnish Navy receives its fifth submarine. Vesikko was formally named at a ceremony in Turku on 1 May 1936.

the submarine school of the German Navy carried out diving and torpedo drills with the vessel. Robert Bräutigam was still the commander of the vessel, while Heinrich Papenberg served as its engineer. Captain lieutenant Haakon Grönholm acted as the liaison officer of the Finnish Navy. The shipyard offered the vessel again for acquisition, but the Finnish Government was not willing to propose the appropriation to Parliament for approval. Instead, the Government agreed to an arrangement in 1934, according to which the Defence Forces would temporarily take over the vessel. This took place on 23 October when captain lieutenant Arto Sakari Koskinen (Kivikuru) was appointed commander of CV-707, and the vessel started to operate under the

Lieutenant general Hugo Österman, the commander of the Finnish Armed Forces, visiting the newest submarine.



Finnish war flag and pennant. The vessel was transferred from Turku to Suomenlinna where it was moored over the winter together with other vessels of the submarine fleet.⁴ During the 1935 sailing season, the Finnish Navy continued to test CV-707, with captain lieutenant Kalervo Kijanen acting as its commander. In the 1935 extraordinary budget, Finnish Parliament granted an appropriation to acquire the submarine. On 15 January 1936, the Finnish Government decided to acquire the vessel at 19.4 million Finnish marks. On 1 May 1936, the vessel was named Vesikko.⁵

In 1936 and 1938–1939, Vesikko, together with other vessels of the submarine fleet, took part in naval drills in the Finnish archipelago

with lieutenants Veijo Virkki, Veikko Poutiainen and Kauko Pekkanen acting as commanders. The drills were mostly carried out from Lappohja, with minelayer Louhi, the depot ship to the fleet, acting as the target during torpedo drills. During winter, Vesikko and other vessels of the submarine fleet were stationed at Suomenlinna docks. The crew lived in Länsi-Mustasaari barracks in Suomenlinna.⁶



The submarine fleet assembles at Svartbäck off Porvoo on 20 June 1941. The submarines Vetehinen, Vesihäisi and Iku-Turso are tied up to the left side of the icebreaker Sisu acting as the depot ship to the fleet. Vesikko and Saukko are tied up to the right side of the depot ship.

Vesikko at war in 1939–1944

As the threat of war grew in Europe in autumn 1939, the Coastal Fleet was ordered to safeguard the impartiality of Finland starting from 9 September. The submarine fleet operating under the command of captain lieutenant Arto Sakari Kivikuru was directly subordinated under major general Väinö Valve, the commander of the Finnish Navy. During the mobilisation of October 1939, submarines Vesihäisi, Vesikko and Saukko, and icebreaker Sisu acting as their depot ship, remained in Helsinki. Vetehinen and Iku-Turso, the two other vessels of the fleet, were assigned to operate in the Archipelago Sea. Commanded by lieutenant Kauko Pekkanen, Vesikko started its patrol missions in the western Gulf of Finland, together with Saukko and Vesihäisi. They were based in Helsinki and the Inkoo islands.

After the Soviet Union attacked Finland on 30 November 1939, the commander of the Finnish Navy ordered the submarines to relocate to their operating areas. On the same day, intelligence sources of the Navy staff in Estonia revealed that *Kirov*, a vessel of the Baltic Sea Fleet of the Soviet Union, was on its way north off Hiidenmaa, accompanied by destroyers. The commander of the Finnish Navy ordered Vesikko and Vesihäisi to patrol the waters off Hanko. Due to air-raid warnings and bombings, Vesikko's departure from Helsinki was postponed to the night of 1 December. When the vessel reached its destination off Hanko, there was a firefight between *Kirov* and the Russarö artillery battery, and Vesikko was unable to reach an attack position. The vessel patrolled off Hanko until 4 December when it moved to Turku to have a malfunction in one of its two main engines repaired.

On 17 December, the Soviet Union launched a major offensive on the Karelian Isthmus. At sea, the operation involved battleships *Oktyabrskaja Revoljutsija* and *Marat* of the Soviet Baltic Sea Fleet which fired the Saarenpää fort in Koivisto. On 18 December, the commander of the Finnish Navy ordered Vesikko to move to Koivisto where



Lieutenant commander Olavi Aittola, the commanding officer of Vesikko, and lieutenant Lauri Parma, the executive officer, on the bridge of the submarine in summer 1941.

it arrived late the next day. It detected no battleships and, finding operations difficult due to temperatures of -25°C , Vesikko returned to Helsinki on 22 December. On 29 December 1939, the vessel lowered its war pennant and it was docked in Suomenlinna, together with submarine Saukko.⁷

During the 1940 season, the operations of the submarine fleet were restricted by the severe fuel shortage. As a result, Vesikko's drills were limited to weekly dives off Helsinki. Lieutenant Olavi Aittola acted as the commanding officer. The vessel's anti-aircraft weaponry improved significantly after the Danish 20 mm Madsen gun was installed. Vesikko was stationed in Suomenlinna for the winter, together with most other vessels of the submarine fleet.⁸



Vesikko's crew on deck at the start of the Continuation War in 1941.

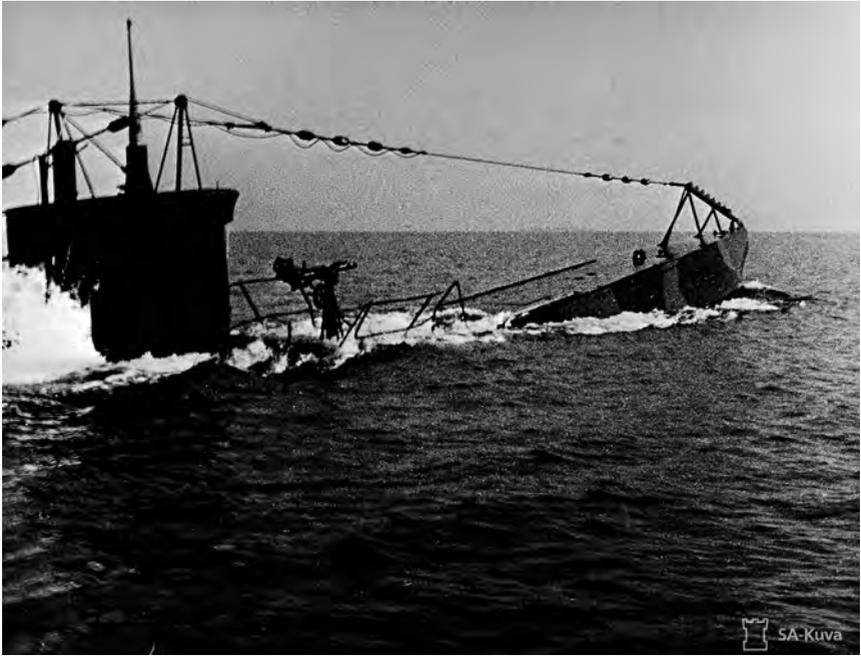


In 1940, light 20 mm Madsen guns were purchased for the Navy from Denmark. One of them is being disassembled for maintenance in Vahterpää, in the Loviisa Archipelago, in July 1941.



Submarine Vesikko is moored alongside submarine depot ship Sisu in Vahterpää, taking on new supplies and torpedoes after a successful patrol in July 1941. Lieutenant Lauri Parma, the first officer of Vesikko, supervises the loading of new torpedoes.

The political and military situation in the Baltic Sea region changed for Finland as the Baltic countries were annexed to the Soviet Union and the expected German offensive in the east accelerated submarine equipping for the 1942 season. On 12 June 1941, combat weapons were installed on the vessels. Next, Vesikko, commanded by captain lieutenant Olavi Aittola, moved to Emäsalo in the Porvoo archipelago, together with other vessels of the fleet. On 20 June, the Navy staff issued a command, as a result of which Vesikko was based in Vahterpää off Loviisa.⁹



Vesikko surfacing in the Gulf of Finland in August 1941.

As the war broke out between Finland and the Soviet Union, submarines were ordered to patrol in the eastern Gulf of Finland. On 3 July, Vesikko was patrolling east of Gogland, while Vetehinen was patrolling west of the same island when it encountered *Vyborg*, a 3,500 dwt transportation ship of the enemy, on its way to Vyborg from Tallinn via Gogland. Vetehinen opened fire to the transportation ship at a distance, but to no avail. Vesikko encountered the same ship south of Sommers. The commanding officer detected a grey transportation ship going east at 12:50 pm through the periscope. Vesikko's position was ideal for a torpedo attack: distance to target 700 metres, speed of target 12 knots and angle to target 75 degrees. Captain lieutenant Aittola fired a torpedo from tube three at 1:25 pm. The torpedo hit



Camouflaged Vesikko moored in the Sipoo Archipelago in August 1941.

Vyborg in the stern and caused it to tilt to the right. *Vesikko* fired another torpedo towards the stopped ship. The torpedo malfunctioned and turned right, missing its target. Three MO patrol boats of the enemy came to the scene from Gogland and started to chase *Vesikko*. They also attempted to rescue *Vyborg* which, however, sunk at 2:15 pm. *Vesikko* evaded the enemy's depth charges and arrived at its base in Vahterpää on 4 July.¹⁰

At the beginning of August, the vessel moved to Helsinki and, during one month, completed three patrol missions off Paldiski and Tallinn, without encountering any enemy ships. Due to repairs, *Vesikko* was docked in Suomenlinna in early November.

As the spring was late in coming, *Vesikko* started the 1942 season

on 10 June after a trial dive carried out in Kruunuvuori, commanded by captain lieutenant Antti Leino. On June 12, the Navy staff ordered the vessel to the Barö operating area where it carried out trial dives in Porkkala. In early July, the vessel was equipped with racks for dropping depth charges for escort missions on the surface. As a result of crew transfers in the submarine fleet for training reasons, Vesikko's commanding officer transferred to Vetehinen and he was replaced by captain lieutenant Pentti Airaksinen.¹¹

At the beginning of August, the commander of the Finnish Navy ordered the submarine fleet to move to Åland Islands to perform escort missions. These started after listening drills off Airisto and in the Sea of Åland. On 4 September, Vesikko detected an enemy submarine off the Swedish coast two nautical miles northeast from Simpnäsklubb, but it was unable to reach a torpedo position. Next week, the vessel's fuel pump broke and Vesikko moved to Helsinki for repairs.

In summer 1942, the enemy attacked Sommers in the eastern Gulf of Finland. On 20 September, the Navy staff issued an order to shift to the "Whaling" alert state in order to prevent the enemy's surface combatants heading west from breaking through the defences. The operation also involved small submarines. In late autumn, Vesikko carried out submarine detection missions off Helsinki to no avail. On 2 December 1942, the vessel was docked in the Suomenlinna artillery bay for the winter.¹²

As spring came early that year, Vesikko was able to raise its war pennant on 15 April 1943. Immediately after May Day, the Navy staff ordered Vesikko, commanded by Eero Pakkala, to move to the Hanko operating area, together with Iku-Turso and depot ship Sisu. At the end of May, the vessels moved to waters off Rauma to take part in drills. They returned on 2 June and, for the next two weeks, Vesikko was on six-hour standby in Helsinki.



Equipment needed in command, navigation and control is located in the control room of the submarine. Captain lieutenant Pentti Airaksinen, commanding officer of Vesikko, is at the periscope in summer 1942.

In late July, the submarine fleet moved to Lappohja to take part in diving and listening drills together with German vessels protecting the Naissaari submarine network in Porkkala. At the beginning of August, captain lieutenant Olavi Syrjänen started as the new commanding officer of the vessel. As a result of the change of command, Vesikko performed a drill in the Gulf of Bothnia at the end of August, together with depot ship Sisu, and Vetehinen and Saukko. On 7 September, Vesikko arrived at Katajanokka and, a week later, captain lieutenant Lauri Parma was appointed its new commanding officer.¹³

In late September, the Navy staff ordered Vesikko and Saukko to remain in Helsinki for listening drills and any submarine hunt. The blockade in the Gulf of Finland prevented any enemy submarines from operating in the area, and Vesikko carried out weekly dives and routine services until the end of the year. On 10 January 1944, the vessel moved to Naantali for the winter.

After a mild winter, Vesikko started its new season on 18 April 1944, commanded again by Lauri Parma. In early June, the whole fleet moved to Nagu in response to the Navy staff's combat plan.¹⁴

After the Russians launched a major offensive on the Karelian Isthmus on 9 June, the Navy staff ordered the submarine fleet to move to the eastern Gulf of Finland. The vessel was demagnetised at Lonna island, off Helsinki, after which it arrived at its base in Virolahti on 17 June. During the same night, Vesikko headed for its operating

Next page:

The crews of the submarine fleet received intense training during the winter months. In the spring of 1942, practice in the use of Dräger underwater respirator under the control of captain lieutenant Antti Leino (above right) and sonar equipment are carried out under the control of captain lieutenant Olli Syrjänen in spring 1942.



SA-Kuva



SA-Kuva



Vesikko, in camouflage paint, was equipped with racks for dropping depth charges in summer 1942.

area in the Gulf of Kronstadt, but it was unable to take advantage of the brief period of darkness for hiding its passage on the surface, and it was forced to return. Two days later, the Navy staff ordered Vesikko to move to the Kiuskeri area where it was to fire torpedoes at any suitable targets. In the operating area, the vessel was targeted by the enemy's aerial bombs and was forced to submerge. Due to its heavy equipment and the low saline content in the eastern Gulf of Finland, Vesikko lost its stability and hit the bottom. After the incident, the vessel was forced to return to its base to restore its stability. It did not detect any enemy activities during its remote defence duties in conjunction with the Koivisto evacuation on 22–23 June. By mid-July, Vesikko carried out four patrol missions in Vyborg Bay without encountering any targets.¹⁵

On 15 July, the submarine fleet moved to Kungshamn in Pellinki, from where Vesikko carried out three patrol missions in the Someri–Narvi area without detecting any targets. In early August, the vessel's diesel engines were repaired after one of its cylinder heads broke. Until the truce signed between Finland and the Soviet Union on 4 September, Vesikko patrolled in the Gogland–Sommers area.

As a result of the Moscow Armistice, Finland was forced to break its connections to Germany. After the Germans attacked Gogland on 15 September, the submarine fleet was moved to the Archipelago Sea to prevent the new enemy from invading Åland Islands. According to the terms and conditions of the Moscow Armistice signed with the Soviet Union on 19 September, warships had to return to their bases. The submarine fleet moved to Naantali where, on 2 October, the demobilisation of soldiers and reservists started. On 11 December 1944, Vesikko started its final voyage as a naval combat unit, and it lowered its war flag and pennant permanently on 15 December. In the inner basin of the Suomenlinna dry dock.¹⁶

The final member of the submarine fleet

At the beginning of January 1945, the Allied Control Commission ordered submarines to be disarmed as unnecessary for Finland's coastal defence. The Paris Peace Treaties of 1947 banned Finland from having, for example, submarines, as a result of which all submarines apart from Vesikko were sold to Belgium for scrap in 1953. There was always the hope that the terms and conditions would be alleviated and Vesikko could be saved as a possible training vessel for the Navy. Vesikko was moved to the Valmet shipyard in Katajanokka. There, it hampered the operations of the shipyard and, in 1959, the Finnish Navy decided to sell it. Former submarine officers and the Research Institute for War History prevented the sale, and Vesikko was transferred to the Military Museum of Finland for restoration.

Backed by the financial support of submarine veterans, Valmet and Wärtsilä, Vesikko was cut into five pieces and transferred, using a floating crane, to the Tykistölahti bay in Suomenlinna, close to the base and winter station of the submarine fleet, as designated by the Archaeological Commission.



Vesikko was docked at the Valmet shipyard in Katajanokka in the 1950s.



The restoration of Vesikko was completed in Suomenlinna and the submarine was cut into five pieces for transportation. The conning tower and control room section is being transferred from Katajanokka by a floating crane in September 1962.

As most of Vesikko's equipment had already been assigned for other uses and partly auctioned or been subjected to vandalism, the restoration became a demanding and time-consuming process. The material and financial support of different enterprises, former crew members and the Finnish Navy pushed the restoration process to a start. Replacing missing engine components with wooden copies, restoring the control centre, officers' equipment, gauges and fittings, and building missing parts required the most work. In 1973, the repair and restoration process has proceeded so far that Vesikko was opened to the public as a museum on the anniversary of the Finnish Navy on 9 July 1973. The conning tower was restored at the end of 1980s. Over the years, Vesikko's location close to the waterline has become a problem. During high tide, sea water rises up to the keel, causing constant moisture damage. As a result, nearly all keel plates have been replaced. The wooden main deck was replaced in 1989. To celebrate the 250th anniversary of Suomenlinna, the exterior of Vesikko was fully painted in spring 1998. Museum submarine Vesikko has become one of the most popular attractions in Suomenlinna with 35,000–40,000 visitors every year.



The restoration of Vesikko into a museum submarine was begun in Suomenlinna in autumn 1962 by reassembling the bows, conning tower and stern that had been cut apart.



The restoration of the vessel was a time-consuming and arduous task, since a great part of the fittings and equipment had been auctioned or had disappeared. Chief petty officer Aaro Vuobelainen is putting finishing touches to the torpedo room in June 1973.

Structure and technical specifications

Vesikko is a coastal submarine with a displacement of 254 tons on the surface and 303 tons when submerged and a total volume of 381 m³. Its length is 40.90 m and its width is 4.08 m. Its height from the keel to the submarine network transmitters above the conning tower is 8.60 m. The vessel operated at a depth of 3.83 m. Vesikko has a single structure without any uniformly formed hull. The thickness of the 26.90 m pressure hull is 13 mm. The vessel is not sectioned using any pressure-resistant bulkheads. Vesikko was able to reach the depth of 100 m, albeit during trials it found to withstand pressures at a depth of 150 m.

Bow and stern structures, mouths and covers of torpedo tubes, bow planes and sonar microphones, stern planes, rudder and two propellers are located outside the pressure hull.

Bow and stern structures are connected by the deck made of galvanised steel and coated with mahogany planks. A pressure-resistant conning tower is located in the middle of the vessel. Its top section forms a bridge used when the vessel operated on the surface. The bridge contains a hatch to access the conning tower and control room. Using hatches, the conning tower can be separated from the rest of the vessel to form a pressure-resistant compartment. Two other access hatches lead from the deck into the vessel. When tilted, the bow hatch is used to load torpedoes. The hatch behind the conning tower provides access to the corridor between the control room and engine room.

The 53.3 cm and 1,500 kg torpedoes equipped with a 300 kg charge were Vesikko's main weapons. They were launched from the three torpedo tubes in the bow section using pneumatic pistons. The compressed air returned back to the vessel, preventing any air bubbles from rising to the surface and revealing the vessel's position. Vesikko was only able to house five torpedoes: three in the tubes and two on reserve behind berths in the bow section. In practice, the vessel had no



Chief petty officers at the hydroplane controls in the control room.

backup torpedoes.

Vesikko's anti-aircraft weaponry consisted of the 20 mm Danish Madsen gun (20 mm/40 M) located on the deck in front of the conning tower and the 7.62 mm anti-aircraft machine gun (7.62 mm/33–36) on the bridge. Hand guns included four 7.62 mm Finnish military rifles (m/27), four 6.5 mm Swedish military rifles (m/96), and nine 7.65 mm Parabellum pistols (m/23).

Even though the crew consisted of two officers, two chief petty officers, eight petty officers and six soldiers, of whom chief petty officers and petty officers stayed in the bow section which housed eight berths and lockers for personal belongings. When the section was restored, four berths on the left were removed in order to provide more space for visitors. The officers' section in the bow, consisting



SA-Kuva

Accumulators are serviced during docking in Suomenlinna in winter 1942. The gate of the inner basin in the background.



The electric motor compartment is located in the stern of the vessel.

of four berths separated from the rest of the vessel by a curtain, accommodated the commanding officer, the first officer and the chief engineer. The vessel's nautical charts, rations and handguns were kept behind mahogany cabinets. The stern section, located behind the engine room, consisted of four berths for engineers.

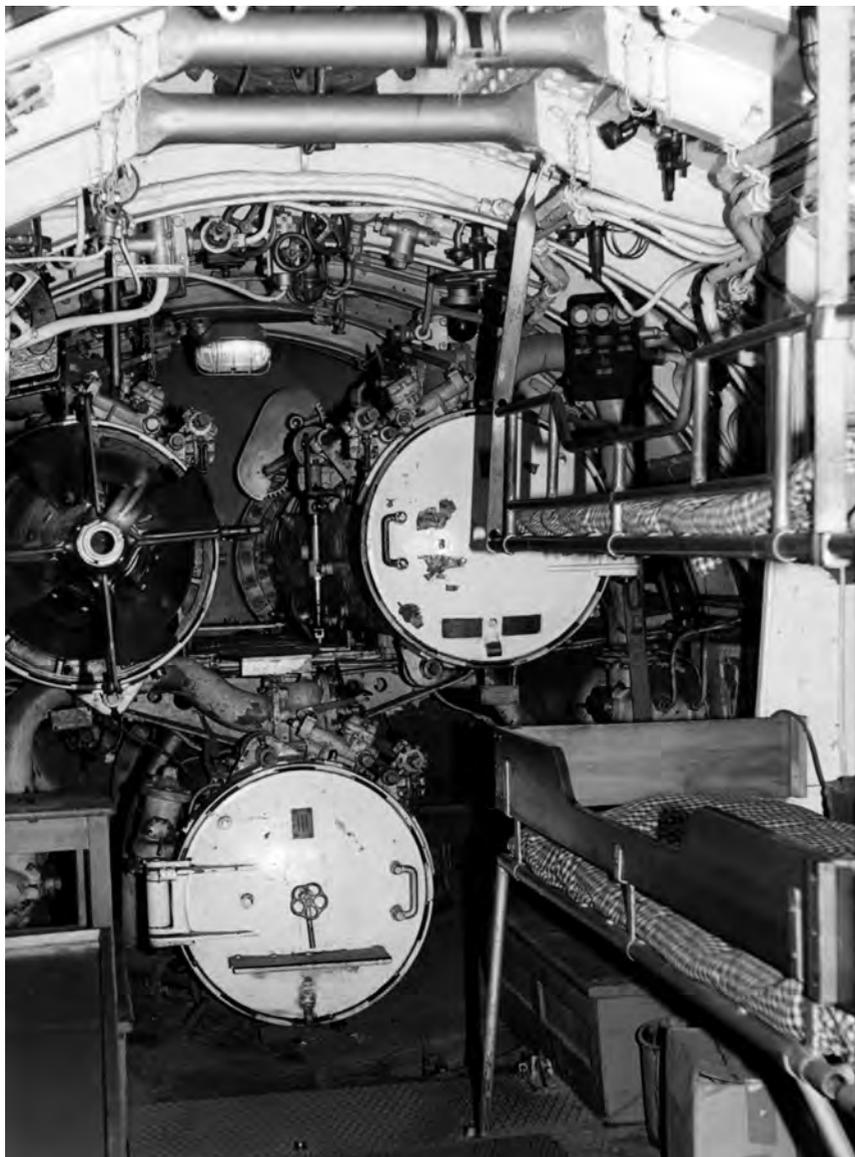
Command and control equipment is located in the control room located below the conning tower. One rudder wheel is on the left side of the bow bulkhead, while the other is located up on the bridge. Next to the rudder wheel, there is a small navigation wheel, and below it, there is the main unit of the Anschutz HMK gyroscopic compass. Subunits are located in the control room and the conning tower and on the bridge. Vesikko is also equipped with the Elmega magnetic compass as a backup system. Hydroplane controls with position indi-

cators, depth gauges and inclinometers are located on the right-hand side of the control room. The control room is dominated by the bifocal Carl Zeiss Nedinsco attack and observation periscopes, the former of which could also be lifted up to the conning tower where the commanding officer was stationed during combat alarms.

When Vesikko was ready to submerge, the lower hatches of its ballast tanks were open and, when it submerged, the air vent valves of the tanks were opened. The tanks filled with water in 30 seconds and the vessel submerged at a depth of 10 metres in 45 seconds. The bow ballast tank (17.9 m³) and the stern ballast tank (8.1 m³) are located in the bow and stern structures and the two-part central ballast tank (23.2 m³) is located inside the pressure hull on both sides of the control room. The weight of the vessel was adjusted according to each operating depth by adding water to the two-part trim tank (6.0 m³) or removing water from it. The longitudinal position of the vessel was adjusted by moving water between the bow (1.91 m³) and stern trim tanks (1.83 m³) by means of compressed air. Surfacing was begun by removing water from ballast tanks by means of compressed air. They were finally drained using the exhaust fumes of the main engines. The compressed air required was produced by a compressor manufactured by Fried. Krupp Germania Werft AG. Its output was 6.21 l/min and its pressure was 180 atmospheres. High-pressure air was automatically reduced to an average pressure of 25 atmospheres using regulators in the control room. Their gauges and wheels had to be built separately during the restoration of the control room.

Vesikko's radio equipment is located in a soundproof radio room located behind the left-hand longitudinal bulkhead in the control room. It is equipped with Telefunken Spez 7 22 S, 72 3 S short- and long-wave equipment, M 1257 p-12-14 Navy radio and Atlas Werke AG's Kristall-Hydrophon.

Henry Hughes Son Ltd's MS XII/1973 sonar is located in cabinets alongside the corridor leading from the control room to the engine room, opposite the small galley and its cabinets. In an emergency, a



The vessel's principal weapons, the 53 cm torpedoes, were fired from the torpedo tubes located in the forward part of the torpedo room.

signal buoy located at the back of the bridge could be released from the control room in order to communicate between the rescue crew and the vessel. In addition, all crew members had personal Dräger respirators, using which they were able to operate underwater and, if required, exit the vessel via hatches or torpedo tubes. Vesikko's main engines when operating on the surface were two six-cylinder four-stroke diesel engines, type RS 127 S, manufactured by Motoren-Werke-Mannheim AG. Their maximum power was 350 hp/1,000 rpm. On the surface, Vesikko's top speed was 13 knots. The 11.15 m³ fuel tanks located under the main engines had enough diesel for 1,600 nautical miles at a speed of eight knots. The diesel engines are connected to two Siemens PGVV 322/96 compound electric motors via gear trains and a release switch. The output of the motors was 132 KW/300 rpm, and 1,000 A/450 rpm when operated as charging generators. The electric motors are still connected to the propeller shafts via switches.

Vesikko is not equipped with a snorkel. For underwater operations, the switches between the electric motors and diesel engines were disconnected, and the power required for the electric drive was supplied by the 62 MAD-Tudor 32 batteries located in the accumulator bay below the bow section. Their total output was 6,380 A/h. When submerged, Vesikko was able to reach a speed of seven knots, while its operating range was 15.5 nautical miles. Batteries were charged on the surface using the electric motors powered by the diesel engines as generators. For this purpose, the electric motors were disconnected from the propeller shafts.

In addition, the engine room is equipped with the Crichton-Vulcan PVS-70 main drainage pump of 750 l/min and the auxiliary Worthington-Brown Bowery & Cie drainage and trim pump of 300 l/min.

The crew toilet was located in the stern. During restoration, it was converted into an access route for visitors. The museum vessel is entered from the bow door cut into the pressure hull.¹⁷

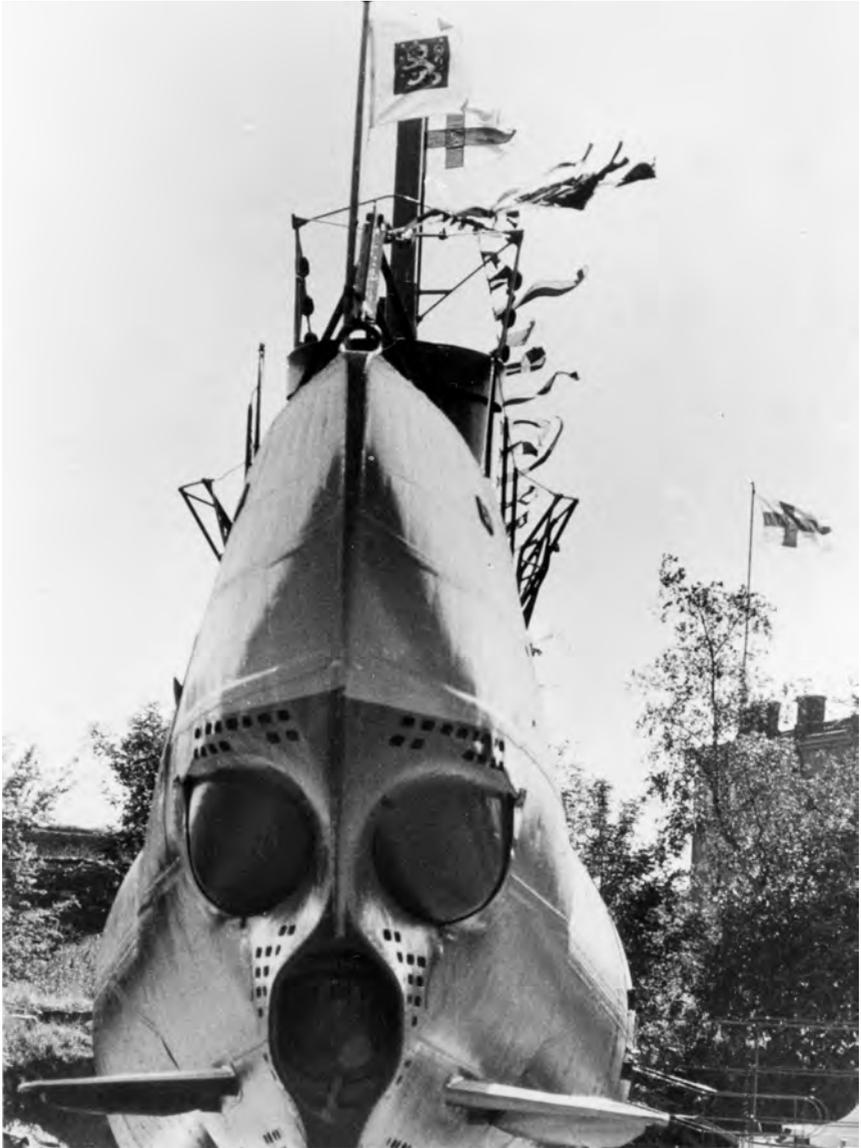
Vesikko, restored to its original condition during the Winter War and the Continuation War, is the last member of our submarine fleet. It provides visitors with unforgettable experiences in the high technical and marine skills submarine crew members needed to master and the conditions in which they operated.



Commander Haakon Grönholm, Finnish supervisor and liaison officer during CV-707 trials in 1934, opened Vesikko to the public as a museum on 9 July 1973.



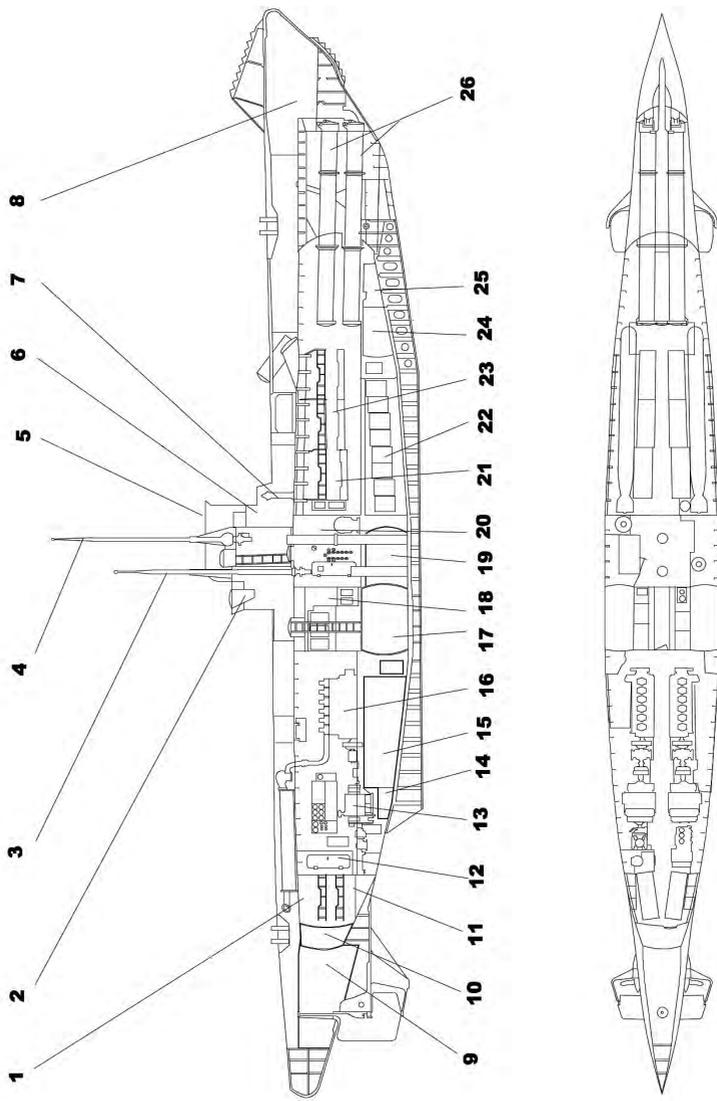
During their annual visit on 9 July 1994, veterans of the submarine crews gather in front of Vesikko in Suomenlinna.



Dressed overall, museum submarine Vesikko is ready to receive visitors on the anniversary of the Finnish Navy on 9 July 1973.

REFERENCES

- 1 Enkiö Sulo: Laivaston synty ja kehitys 1918-1939 (Suomen Laivasto 1918-1968 I, julk. Meriupseeriyhdistys, Helsinki 1968 s. 147).
- 2 Rössler, Eberhard: Das Projekt "Liliput", Marine Rundschau 3/72 s. 129-137 sekä Dönitz, Karl: Zehn Jahre und zwanzig Tage, Bonn 1958, s. 32.
- 3 Herzog, Bodo: Die deutschen Uboote 1906 bis 1945, Munchen 1959, s. 121.
- 4 Rannikkolaivasto päiväkäsky n:o 51/8.11.1934, SArk.
- 5 Enkiö, Sulo, mt., s. 155.
- 6 Enkiö, Sulo, mt., s. 179-180 ja Kijanen, Kalervo: käsikirjoitus "Sukellusvenelaivueen historia", s. 105-106.
- 7 Merivoimien Esikunnan sotapäiväkirja s. 225. 29.12.1939, SArk.
- 8 Kijanen, Kalervo: Laivasto sotatoimissa (Suomen Laivasto... mt.).
- 9 Merivoimien Esikunnan sotapäiväkirja s. 11. 20.6.1941, SArk.
- 10 Merivoimien Esikunnan sotapäiväkirja s. 95. 3.7.1941., SArk.
- 11 Laivaston Esikunnan päiväkäsky N:o 13/1942, SaArk.
- 12 Suv Vesikon sotapäiväkirja 13.1.1943, SArk.
- 13 Sukellusvenelaivueen sotapäiväkirja 16.8.1943, SArk.
- 14 Sukellusvenelaivueen sotapäiväkirja 1944, SArk.
- 15 Suv Vesikon sotapäiväkirja 1944, SArk.
- 16 Suv Vesikon sotapäiväkirja 1944, SArk.
- 17 Suv Vesikon teknillisten laitteiden selostukset, käyttöohjeet ja piirrustukset, SArk ja SMus.

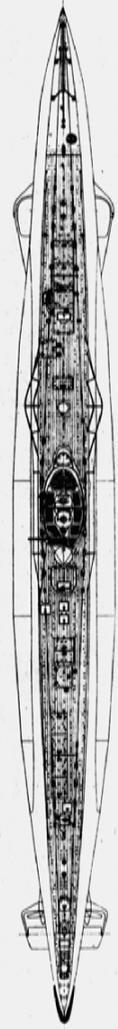
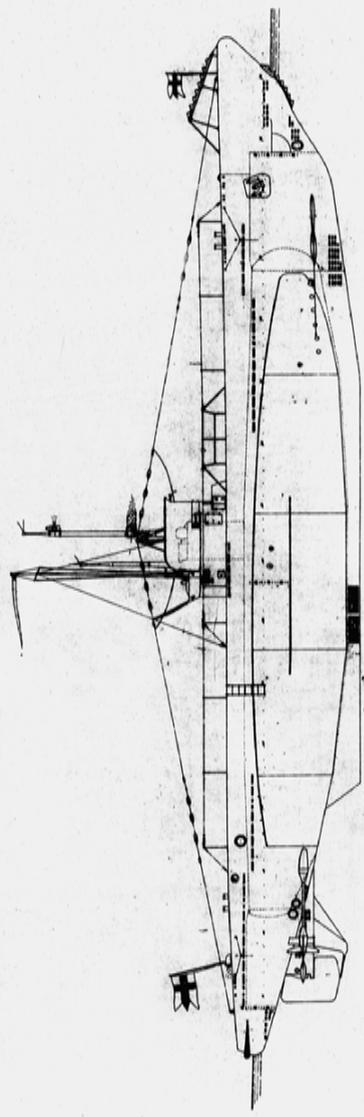


1. PRESSURE HULL
2. SIGNAL BUOY
3. OBSERVATION PERISCOPE
4. ATTACK PERISCOPE
5. BRIDGE
6. CONNING TOWER
7. MAGNETIC COMPASS
8. BOW BALLAST TANK
9. STERN BALLAST TANK
10. STERN TRIM TANK
11. STERN
12. TOILET
13. ELECTRIC MOTORS
14. LUBRICATION OIL TANK
15. FUEL OIL TANK
16. DIESEL ENGINES
17. CENTRAL BALLAST TANK
18. GALLEY
19. TRIM TANK
20. CONTROL ROOM
21. OFFICERS' SECTION
22. ACCUMULATOR BAY
23. PETTY OFFICERS' SECTION
24. TORPEDO OPERATING TANK
25. BOW TRIM TANK
26. TORPEDO TUBES

SIVU-JA KANSIKUVA + SEITENANSICHT UND DECKSPLAN.

C.V. 707.

ENTWURF
VON
J. S. O.



SIVU-JA KANSIKUVA + SEITENANSICHT UND DECKSPLAN.

C.V. 707-FK-38E.

ENTWURF
VON
J. S. O.

1911

TECHNICAL SPECIFICATIONS

Dimensions:	40.9 × 4.1 × 4.2 m
Displacement:	250/300 tons
Speed:	13/8 knots
Diving depth:	100 m
Diving time:	45 seconds to reach 9.3 m
Weapons:	Five 53 cm torpedoes One 20 mm Madsen anti-aircraft gun One 12.7 mm anti-aircraft machine gun
Engines:	Two MWM diesel engines, 700 hp Two Siemens electric motors, 360 hp
Hydrophones:	Atlas Werke 2 × 6 microphones
Fuel:	9.6 tons of diesel oil
Drinking water:	1.2 tons
Operating range and time:	1,500 nautical miles at 10 knots, 150 hours (on the surface), 50 nautical miles at 4 knots, 13 hours (when submerged)
Crew:	20 members

