

Naval War College Review

Volume 45
Number 1 *Winter*

Article 5

1992

Swedish Future Surface Ships and Submarines

Claes E. Tornberg

Follow this and additional works at: <https://digital-commons.usnwc.edu/nwc-review>

Recommended Citation

Tornberg, Claes E. (1992) "Swedish Future Surface Ships and Submarines," *Naval War College Review*: Vol. 45 : No. 1 , Article 5.
Available at: <https://digital-commons.usnwc.edu/nwc-review/vol45/iss1/5>

This Article is brought to you for free and open access by the Journals at U.S. Naval War College Digital Commons. It has been accepted for inclusion in Naval War College Review by an authorized editor of U.S. Naval War College Digital Commons. For more information, please contact repository.inquiries@usnwc.edu.

Swedish Future Surface Ships and Submarines

Rear Admiral Claes E. Tornberg, Royal Swedish Navy

The Absence of a White Paper

CUTS IN MILITARY SPENDING are now an international reality, and Sweden is no exception. The defence of Sweden, however, is more than a question of money. Our neutrality policy is no longer an end in itself but a tool that it is possible to discuss. The preservation of our compulsory service system is also under debate because it is obvious that we can not finance the existing large army if we are also to possess the quality and readiness that we need. A structural reorganization in defence is now taking place, and it is evident that aspects of our defence industry are in jeopardy.

Although we have been blessed since the 1950s with five-year-term defence decision commitments, since the 1970s these commitments have more and more tended to be packed with more ambitions than funds to bring them into being. Therefore, many worthy systems have never been ordered. Even worse, this has prevented developing a new approach to our defence policy; it is my guess that in the near future we will maintain the budget at the same level as in past years, although without long-term commitments. This static budget will compel reconsideration of the defence structure and its objectives.

Immediate results to be anticipated will likely be:

- The military organization, both for peace and for war, will be cut substantially.
- Compulsory service will be transformed into a system that better fits current needs, within obtainable funds.
- The air and naval forces will be reduced in size, but will have the quality necessary to perform as conditions demand.

Admiral Tornberg has served primarily on destroyers and torpedo boats and has commanded several ships and squadrons. Ashore he served on the Defence Staff and on naval staffs. He has been head of Planning Division, Naval Staff; Chief of Staff, Active Fleet; and Commander in Chief, Active Fleet. Admiral Tornberg is a graduate of the U.S. Naval War College and is currently Director of the Armed Forces Staff and War College in Stockholm.

- The army will be a mix of old and modern units, while reduced in size to half or less.

Missions and priorities for defence could be likened to “bricks in a wall,” the bottom layer the protection of Sweden’s territorial integrity by means of peacetime air defence, sea control, sea-lane security, and security from strategic assault. The second layer is possession of the ability to force an aggressor to step up his attack only at significant political cost to himself. The “bricks” we need here are: the ability to defend ourselves against coastal invasion; against invasion over the northern border; and the geographic flexibility to protect areas not initially attacked. The final layer in the wall is the ability to fight a protracted war. The objective here is to deter aggression by making any effort to conquer Sweden so time-consuming that no potential aggressor will risk it.

This structure will afford us both continued high quality in our forces and a higher state of readiness even though our forces will be smaller than they are now. This plan will tilt somewhat in favour of the use of air and naval capabilities.

The Baltic—A Sea of Peace?

The Baltic has always played a key role in Swedish security. The collapse of the Warsaw Pact creates a new situation—but new in a way quite different from that in Central Europe. Earlier, the Baltic was in effect a flank of the front line in Central Europe. The situation is now much different and more complicated as a result of the independence of the Baltic states, the growth of a free national state in Poland, and the unification of Germany. In many respects our situation is very much like that of the early years of this century—and we know what followed then. For me it is quite clear that the Baltic is not yet a “sea of peace.” There is obviously danger of regional or low-level conflicts. The risk of a large amphibious invasion of Sweden or the Baltic approaches is now very much reduced, but the potential is still there.

It is important that Sweden be prepared to defend her interests in the Baltic; it would be cost-effective for her to use the Baltic as a defended moat. There are signs that this insight is gaining recognition, and I hope this will soon be a cornerstone of the Swedish defence strategy.

What Navy Do We Need in the Future?

The current missions for the Swedish Navy are surveillance and showing the flag, protection of fishing, control of our territory, protection of coastal traffic and sea lines to the island of Gotland, and sea denial defence against amphibious assault.

The navy we have today is well balanced with respect to its missions, except in the antisubmarine warfare field, but the small number of ships forces us in

many operational situations to restrict our deployment of naval forces to one area at a time.

It is possible that the navy will have to take on a larger share of the anti-invasion mission. We must ensure that there will be no easy way to attack us by means of amphibious assault. In particular we must guard against sudden attacks that allow an aggressor to defeat us before we even know that we have been attacked. The probable purpose of such an attack would be to take central and southern Sweden with its air bases and infrastructure. Once he achieved that, the aggressor would have at the same time achieved control of the air over our country and, potentially at least, over some of our neighbors and the nearby seas through which help, if any, would have to pass.

Requirements for future Swedish naval vessels are, therefore: the autonomy to operate, with a reduced capacity, away from naval bases and the command structure; reduced ship signatures in order to counter enemy surveillance both on the surface and below; tactical capacity to evaluate the target data in a difficult electronic countermeasures and decoy situation; and weapons that can win with the first salvo.

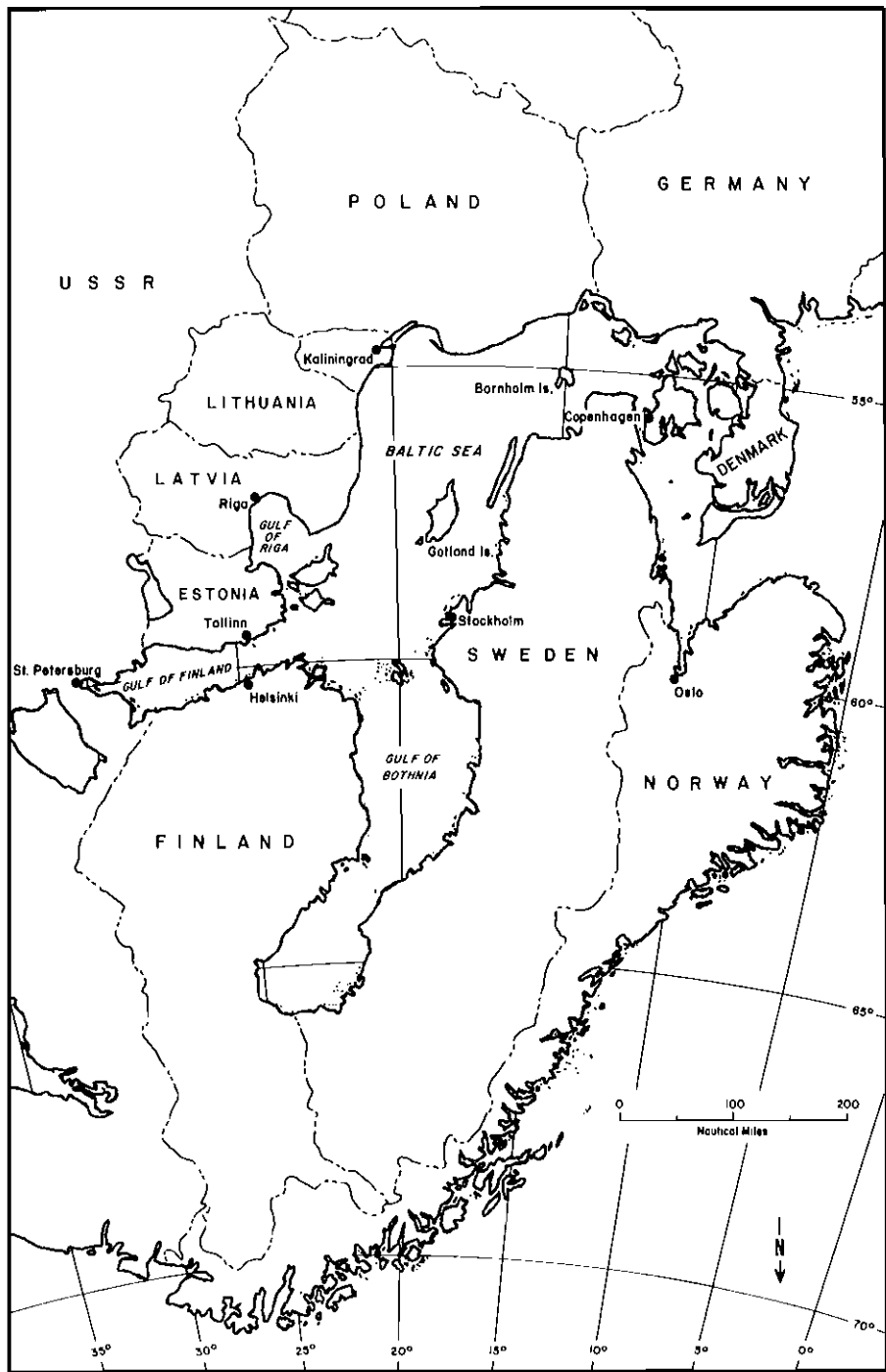
Despite our surrounding narrow and shallow waters our ships must have good endurance at sea if we are to have the necessary naval presence and readiness. Flexibility and capability for many missions are needed in a small navy such as ours. A high degree of quality is a must now, and will be in the future.

We will, of course, need air support for our naval forces and mobile ground units to defend our archipelagoes. However, I will not go into this in this article.

To have a balanced fleet in the future, our nation must have both suitable surface attack ships and submarines that can significantly influence naval warfare. If one of these elements is missing, the gap in capability will be so large that the whole naval posture will have to be reevaluated.

More Ships or Better Ships?

In any event, "Submarine 2000" seeks to increase the number of our submarines without an increase in our budget. Its overriding principle is to make each submarine designed cheaper than the one before. Budgetary constraints, however, are reducing the number of ships of all types and classes. For example, we have only two *Stockholm*-class corvettes, four *Göteborg*-class corvettes, three *Näcken*-class submarines, and three *Gotland*-class submarines. Lack of funding also hurts training and the supply of replacement parts. Hence, savings resulting from developments in the technical field must not be eaten up entirely in the search for higher performance. The two key words are *simplify* and *standardize*. Since Sweden builds for other nations, the Swedish Navy must refrain from exclusive solutions and seek technical solutions built in our country for the international market.



Sweden and the Baltic

The next surface combatant that we build will accommodate different kinds of standardized equipment according to the need. We do not believe, though, that a "container solution" is cost-effective. It must also be noted that if one puts too many requirements in the same type of basic ship design, one can end up with a negative cost curve.

Future Surface Ships

The surface fleet today consists of:

- For attack—twenty-eight missile boats of two classes built in the late 1970s and six corvettes of two classes. The last four of the corvettes will be fully operational in 1993.
- For mine countermeasures (MCM)—seven modern mine hunters.
- For ASW—new corvettes and mine hunters have been designed with antisubmarine capabilities. Some of the missile boats have just been modernized with a dipping sonar.
- For minelaying—all our naval combatants can carry mines.

Most of our surface fleet will be outdated around the year 2000 and will need to be replaced. We have very rarely built prototypes in the navy, but have found it necessary to build one, and it was launched recently. Its purpose is to verify various ideas for construction, research and development, and so forth. More specifically we expect it to provide us with more extensive knowledge on aspects of stealth: optical, radar, infrared, acoustic, and magnetic signature as well as such matters as operational utilization of communication systems and radar. If the prototype proves satisfactory, the next generation of surface ships may well be based on its design.

Operationally, we have evaluated various combinations of attack, ASW, and MCM capability, and we believe that the best solution for the future is a corvette-sized platform with both attack and ASW systems.

For smaller patrol craft we decided on two versions, one majoring in attack capability and minoring in ASW, and the other with an equal combination of ASW and mine-hunting capability. The aim for the future studies is to combine these two versions in a single basic design. The first ships to be ordered are in the present construction plans, the MCM-ASW ship in 1992 or 1993. Besides stealth optimization, key elements in this effort are new weapon, communication, and sensor systems; the surface-effect ship principle and water-jet propulsion; and glass-reinforced plastic structure.

The present schedule projects the first series of evaluations to be completed in 1993.

The shift during the 1960s toward small ships has helped substantially to reduce the risk of detection both at sea and in naval bases in the archipelagoes. The stealth properties which reduce the distance at which the vessel can be

detected are useful in both defensive and offensive modes. The *Hugin*-class missile boat is an excellent example of a very reduced radar signature. The requirement since the early 1980s for an ASW capability in our surface ships has taught us a great deal about noise reduction. The new corvettes of the *Göteborg* class have very silent water-jet propulsion. We also plan to test and add a towed array system.

Modern sea-target missiles will not lock on the prototype if our calculations are correct. We will see. The most important thing is to reduce detection in the first place. Despite the trend toward greater "transparency" over, on, and under the surface, we believe that it is possible to make these small ships very difficult to detect. We are learning a lot.

Future Submarines

There are twelve submarines in three classes, all completed between 1967 and 1990. The oldest of these are the five of the 1,100-ton *Sjöormen* class.

A new design, the *Gotland* class, has been ordered and will be operational around 1995. But as there will be only three in the class, two of the *Sjöormen* class will probably be modernized and kept in service.

The *Gotlands*, of 1,300 tons, are enlarged developments of the 1,100-ton *Västergötland* class of four completed in 1987-1990. Compared to their immediate predecessors, the *Gotlands* will have both more endurance and less detectability.

Great efforts have been made in Sweden to find a non-nuclear air independent propulsion (AIP) system. A closed-cycle diesel concept was developed in conjunction with the *Sjöormen* class. The concept was to provide all the submarine's power needs, but it was disappointing. Unreliability and rising costs forced us to abandon the project. Another try with a fuel-cell concept was made for the three-ship *Näcken* class, but it also had to be abandoned. After these two setbacks, a basic requirement was set that further AIP projects not endanger the entire submarine project.

The solution we decided on was to add AIP machinery to the Stirling engine. The development has gone step by step from laboratory to a full-scale test section (1984) and to installation in an 8.5 meter section added to a *Näcken*-class submarine (1988). The two Stirling engines have run for more than 2,000 hours, and the experience with them is astonishingly positive. The Swedish Navy now considers the add-on AIP to be fully operational and expects that it will remain on board for the lifetime of the submarine.

The advantages to an add-on AIP in a conventional submarine are that endurance is extended, air-independent drive can be activated more easily, the necessity to expose masts, etc., above the surface can be greatly reduced, and the

risk of detection is drastically lessened. The add-on AIP for the *Gotland* class has just been ordered.

As with the surface ships, we have found that we have now arrived at a turning point where we must study an entirely new concept. If we continue to develop future classes of submarines on the basis of their predecessors, size and costs will continue to rise.

We are currently studying the issues of:

- Machinery type: Stirling, diesel, or batteries. Should it be completely air-independent or just partly?
- Propulsion systems.
- Power distribution, and the number of subsystems and components.
- The balance between artificial intelligence in the weapons and in the weapon control systems.
- The possibility of having one watertight compartment.
- Eliminating penetrating masts and generally reducing penetrations through the pressure hull.
- The hull configuration.

We hope that in the future we will be able to maintain the size of our submarine fleet as well as its capability to fulfill our missions in a demanding threat environment.

Conclusions

The Swedish Navy is today a small, well-balanced, and modern navy. About a decade ago the Swedish defence doctrine started to change from pure defence against invasion to a more flexible defence. The concept today is to meet different forms of aggression, ranging from low-level threats and surprise attacks to a large-scale invasion. This will, of course, have an influence on the structure of the future navy. The new strategic conditions in the Baltic will place increased demands on the navy. Present economic constraints will hamper proper development for the near future, but Sweden has favourable technical prospects for meeting its long-term requirements.

The Swedish Navy has, for two decades, tried to have ships that are hard to detect in bases and in the archipelagoes as well as at sea. So far we have been partially successful. Stealth technology implemented in our small coastal surface ships and submarines signifies new possibilities. We intend to exploit them.