

CV: **Dudu Shiek** Cap. (Navy, res.), Ph.D. (King's College University in London, The development of the naval warfare doctrine of the Israel Defense Forces.)

**Dr. Reuven Pedatzur** is a senior lecturer at the Strategic Studies Program, Tel Aviv University

## **NAVAL POWER AND ITS IMPORTANCE FOR ISRAEL'S FUTURE SECURITY**

*Dudu Shiek and Reuven Pedatzur, May 2002*

The entry into the 21<sup>st</sup> century and the future naval battlefield requires a new concept of security, including a change in the navy's objectives. The range of threats against the State of Israel from sea (firing from beyond the horizon) and land (ground-to-ground missiles), together with the lack of land strategic depth that intensifies the ground-to-ground missile threat against infrastructures and command and control centers, underlines the importance of maritime strategic depth, where the navy has an advantage in mobility (particularly in missile boats) and survivability (particularly in submarines).

Today, however, Israel's naval superiority (i.e., in naval control and the technological gap) in the Eastern Basin of the Mediterranean is in danger because of the strengthening of the Arab navies, which also endangers Israel's plans to use its maritime force as part of its "second strike capability," that would upgrade Israel's deterrent capability. This article will analyze the balance of power between the Israeli and Arab navies, the structure of Israel's navy, the capabilities required for the future naval battlefield, and the strategic threats to the State of Israel, which require fully integrating the navy into the new strategic concept as an answer to those threats.

### **Israel from the Geopolitical Standpoint**

Israel neighbors the peripheral reaches of the arterial shipping lanes of two seas: the Mediterranean and the Red Sea. The strategic lanes of the Mediterranean can be severed at many points, and the lanes in the Red Sea can be severed particularly easily at Bab el-Mandeb and south of the Sinai, at the entrances to the Suez and Eilat gulfs.<sup>1</sup> In the Mediterranean, Israel is wedged between two maritime areas to the north and south, and faces a maritime expanse to the West.

From a geopolitical standpoint, Israel resembles an island: surrounded on land by hostile countries, with the one free egress being the sea.

## A Naval Siege

Israel's land encirclement and dependency on foreign markets, particularly energy sources, have made it highly vulnerable to the blocking of sea-lanes. Hence, since the state's establishment there has been great sensitivity to the possibility of a cutoff of the sea-lanes, and a prevailing sense of encirclement with maritime egress as the only recourse in the ring of encirclement, and it, too, partly subject to the control of hostile countries (though one of them, Egypt, is in a state of "cold, armed peace" with Israel).

Israeli shipping can be harmed in three possible ways:

1. Shipping in the Suez Canal, which is indeed an international waterway but is entirely under Egyptian sovereignty;
2. Shipping in the Strait of Tiran, which controls entry to the Gulf of Eilat;
3. Disruption of shipping in the Mediterranean.

The fact that the international shipping lane passes between the two flanking maritime areas makes it difficult to identify the actors that pass through it and their tendencies, especially considering the location of Cyprus, which is on the lane and relatively close to Israel. On the other hand, actors that move in the international lane have a convenient and definite ability for pinpointing the coast of Israel and the locations along it. The maritime expanses enable all actors to move without any obstacle or hindrance, and even to draw within close range of Israel's coast.<sup>2</sup>

The boundary of the sovereign waters<sup>3</sup> is much smaller than the range available for intelligence, communication, and observation. In this regard, the hostile (and peripheral from a land standpoint) North African countries constitute direct confrontation states in the maritime context. The distances between the maritime areas within which Israel is wedged (Israel having the shape of a long, narrow sausage with a "soft belly") and the coast of Israel, are short and enable access for purposes of attacking Israel's coast or vital shipping, in short time spans of a single night.

The enemy has a considerable number of anchorages and ports in which he can deploy and disperse his force, defend it, and launch it, making things quite difficult for the Israeli navy, which the enemy can strike by segmenting his force. In the Mediterranean Israel has only two ports, and only one of them, Haifa port, can serve as a base for its main force (missile boats and submarines). The Mediterranean is the vital marine arena of the State of Israel, both because of the deployment of Israel's strategic infrastructure along its coast and because this sea is also the state's principal and vital cargo lane. Except for a brief, stormy winter period,

or the areas of the Strait in the northern Red Sea, most of the year the Mediterranean and the Red Sea enjoy relatively mild maritime conditions that more or less enable both shipping and warfare. The Mediterranean, because of the disparities of temperatures between the different water levels, constitutes a very convenient range for submarine activity. The land shelf gradients and the valleys near the anchorages enable them convenient and extremely close access to the harbor entrances for purposes of minelaying and ambushes.

### **The Maritime Arena of Battle**

The maritime arena is divided, from the standpoint of Israel and its forces, into three categories:

1. Navies of direct confrontation;
2. Navies of indirect confrontation;
3. Navies of powers and other countries that sail in the arena but are not in direct military confrontation with Israel.

Israel's central location between Syria and Egypt enables it to focus efforts at strategic points and to move within the "internal lines". From the strategic standpoint, the main arena of effort is the eastern Mediterranean, from the Crete line and in areas of "vital waters" (strategic areas of control at key points), and in the Red Sea from the Sudan-Egypt border. The secondary arena of effort is the central Mediterranean between the Crete area and Sicily and in the Red Sea – from the southern Red Sea to the Sudan-Egypt border.

In the Mediterranean there is also a possibility of warfare by the peripheral countries, such as Libya and Algeria, in one of three potential scenarios:

1. The sending of naval task forces by Algeria and/or Libya and their integration into the Egyptian navy's planning and in a naval war.
2. The Algerian and/or Libyan navies providing missile-boat protection to a naval blocking force.
3. Saudi Arabia could also act, by helping the Egyptian navy in the Red Sea and the Gulf of Suez, or transferring a naval force through the Suez Canal in a relatively short time, which would also be involved in the Egyptian navy's activity in the Mediterranean.

Therefore, it is necessary to regard the arsenal of the navies of the Arab states as a single enemy navy, which will have to be dealt with in time of war.

## Force Ratios and the Naval Threat of the Arab States:

### Egypt:

The core of Egypt's navy includes four American frigates – the *Mubarak* (ex-US OH Perry) armed with SSM Harpoon missiles (model-c), for 70 miles; two *El Suez* (*Descubierta*) frigates with Harpoon SSM 4x2 missiles; two *Zaffir* (PRC *Jianghu I*) frigates with two CSS-N-2 (improved “*Stykes*” missiles); two *Damyat* (US Knox) frigates with eight Harpoon SSM missiles. There are 25 additional missile boats: six *Ramadan* boats with four *Otomat* SSM missiles, five *Osa* missile boats with four *Styx* SS-N-2A missiles, six October 6<sup>th</sup> missile boats with two *Otomat* SSM missiles, two *Sov Komar* missile boats with two SS-N-2A *Styx* missiles, and six PRC *Hegu* (*Komar*) missile boats with two SS-N-2A *Styx* missiles. The Egyptian navy also has SAM sea-to-air missiles for 25 miles and a 46 MK mode-5 smart missile that operates against submarines actively and passively up to 5.9 miles at 40 knots and with a 44 kg. warhead.<sup>4</sup> The Egyptians intend to replace the four old Chinese *Romeo* submarines (with Harpoon SSM) with Dutch *Moray* diesel submarines. The submarines are designed in the Netherlands, with construction planned for the United States.<sup>5</sup> The target date for supply – 2007.<sup>6</sup> *Romeo* submarines have been capable of firing Harpoon missiles since the 1990s. The Egyptians also aim to reinforce the surface boats by ordering from the United States four rapid missile boats of the Ambassador MK3 model, boats whose manufacture began in 2001. Their length is 62.62 m., their speed is 40 knots, their weight is 550 tons (known as PCFG). The Egyptians also recently ordered six Hawkeye intelligence aircraft from Grumman Northrop from the FMS funds, as well as the Ambassador submarines.<sup>7</sup>

The Egyptian attack force, which numbers 18,500 seamen, also includes 24 undersea attack helicopters, five of them Sea Kings armed with a smart torpedo produced by the United States – the MK47, and sophisticated coastal protection equipped with Atomic missiles.<sup>8</sup>

The Egyptian navy is being constantly revamped, and it upgrades itself with massive American support. It is closing gaps *vis-à-vis* the Israeli navy with “shelf purchases” that reduce the technological gap, such as, for example, Harpoon Block II missiles, whose sale to Egypt the US government approved. These can also serve as submarine-launched cruise missiles (the Egyptians also desiring to purchase Dolphin submarines from Germany).<sup>9</sup> The Egyptians are also developing an antisubmarine aerial warfare capability utilizing helicopters. Such a capability would likely threaten to some extent the submarine-based “second-strike capability” that Israel is developing.

To all this must be added the capability of the state-of-the-art aircraft of the Egyptian air force, the F-16D and the Mirage 2000C, which are equipped with sea-to-air, Harpoon, and

Exocet missiles for targeting surface vessels. The Egyptian navy has been primarily Western since the beginning of the 1980s, when it converted the engines of its aged *Osa* 1 missile boats to Western diesel engines and acquired Western electronic systems, mainly British (1200 *Decca* navigation/search radar and *Decca* RDK – an electronic disruption system), while also acquiring French *Otomat* sea-to-sea missiles.

Egypt has also expanded the construction capability of its shipyards, basing this on the Soviet design of the body of the *Komar* ship (which has been in the service of the Egyptian navy since 1962) integrated with Western technologies. Today, most of the force of the Egyptian-manufactured *October* and *Ramadan* vessels consists in their being armed with French and Italian missiles of the *Otomat* model and in their having electronic control systems combined with British-produced missiles and cannons (801 ST). (European-manufactured electronic countersystems, which are an integral element of the missile boats, also became available to the Arab navies in the 1980s.)

Thanks to the project of massive acquisition of advanced weapon systems, the Egyptian navy has become most impressively powerful.<sup>10</sup>

#### **Algeria:**

About 7,000 people serve in the Algerian navy. The main attack force: two Soviet KILo submarines equipped with a 533 MMTT torpedo/three frigates (*Sov Koni*) with SA-N-4 *Geko* Sam missiles, five Corvettes (*Sov Nanuchka* II) each with four *Styx* SS-N-2C missiles, nine *Osa* missile boats each with four *Styx* SS-N-2C missiles, and dozen of Russian MI-14 naval attack helicopters.

#### **Libya:**

About 8,000 people serve in the Libyan navy. Main attack force: two submarines (*Sov Eoxtrout* model) with 533-mm. torpedo tubes, two frigates (*Sov-Koni*) with four SS-N-2C *Styx* missiles, three frigates (*Sov Nanuchka* II) each with two SS-N-2C *Styx* missiles, and 13 missile boats (*Fr Combattant* II) each with four *Otomats*.

#### **Saudi Arabia:**

The Saudi navy comprises about 15,500 people. Main attack force: four frigates (Fr-2000) with eight *Otomat-2* missiles, four Corvettes each with eight Harpoon missiles, and nine missile boats each with four Harpoon missiles.

**Syria:**

About 6,000 people serve in the Syrian navy. Main attack force: two frigates (*Sov Petya*) with five 533-mm. torpedo tubes, ten missile boats (*Sov Osa*) with four SS-N-2C *Styx* missiles, and 20 *Sov Mi-25* attack helicopters with naval capabilities.<sup>11</sup> Syria has four submarines, three of them inoperative and the fourth serving as a “service submarine”.

The equipment of the regional states with integrated, compact, and modular systems (for simple operation and convenient maintenance) contributes to the power of the rapid missile boats, no less than do the missiles they carry. The designing of the rapid missile boats, which were already planned in the world in the 1980s, was manifested from the 1990s to the present by such elements as:

- Sophisticated weapon control systems with target-seeking radar, control radar for an automatic cannon, and a digital computer for naval missile systems with two separate channels for fire control and for cannons;
- Passive and active electronic systems with passive sensors that give an indication of radar operations of enemy boats via closed-circuit television and infrared discovery and tracking equipment, and also by means of passive electronic measuring equipment that follows after the enemy's radar operations, analyzes the broadcast it has discovered, and afterward identifies and gives a direction;
- Information operation systems: a multisituation tactical presentation board that gives the missile-boat commander an accurate and inclusive picture of the situation of the warfare arena

The *Exocet* and *Otomat* missiles that the Arab states have acquired are *not* inferior in level of performance to the Israeli Gabriel missiles. The Arab states' missile boats are also equipped with electronic warfare systems such as: *Prateam*, *Dagaie*, Thomas and Bandt. These are dispersed in an area of about 300 m. at a height of 40-60 m. in five minutes, and thus are capable of covering a 20-ton rapid missile boat from radar detection.

**The technological improvements in the Arab navies are manifested in five main areas:**

1. Missile ranges (the missiles can be launched from the sea, the shore, and the air) reach beyond the horizon, from 70 to 300 km.
2. The Arabs have a variety of about 18 kinds of missiles with advanced warheads, both Eastern and Western (compared to one or two in the Yom Kippur War), with warheads

with a domestication and acquisition capabilities on small targets and a navigation and secret movement capability up to hitting the target.

3. The Arabs have acquired a large quantity of targeting helicopters for search (detection and identification) and attack above the sea, which take off from coastal defensive fortifications and also from on-deck missile-boats in the open sea (helping also in anti-submarine warfare, in aiming missiles, and in electronic disruption).
4. Most of the new missile boats acquired by the Arab navies come to a size of 2,000-6,000 tons, giving them a capability for ongoing autonomous operation, a large quantity of armament, a capability for carrying antimissile and anti-aircraft defensive systems and a helicopter, and an operative capability in inconvenient sea and weather conditions in which the air force is unable to operate.
5. Shore commands have been established in Syria, Egypt, and Libya that are based on control systems, observation, and fire control for large beyond-horizon ranges.

The operative implications of these data are that the Arab-state navies are capable of movement in electronic silence of task forces with encrypted, rapid and foolproof communication between them, and of massively attacking from beyond-horizon ranges the Israeli coast in the Mediterranean or targets near to it, so that the Israeli air force or submarines would not be able to prevent the attack or react to it effectively, during or after its execution. That is certainly the case if the attack, as mentioned, is carried out at night, involving deployment from different directions or exploitation of the movement of international shipping and/or of the maritime powers. The enemy's missile boats, which are equipped with floating anti-aircraft defensive systems, are capable of deterring and even preventing the Israeli air force planes from getting close to the enemy planes in the sea at identification ranges.<sup>12</sup>

In addition to and beyond the grave implications of the technological quality available to the Arab navies, it is feared that in the future they will also acquire long-range cruise missiles – such as the American Tomahawk, which can hit a sea or land target at an accuracy of 10 m. CEP with a warhead between 450-1,000 kg., and can be launched flexibly from different points on the maritime expanse from ranges of up to 2,500 km. The Soviet navy has also maintained for 15 years the SSN-3 missile with a warhead of 500-1,000 kg., which is launched from submarines or surface vessels at a range of 300 km. toward a land target, at an accuracy of 150-300 m.

Such cruise missiles can be installed on most of the new platforms that the Arab navies possess (which are partly Western). Such missiles would likely constitute a direct and real threat to the operative capability of the airports of the Israeli air force and to other strategic targets in Israel. One must also take note of the fact that the Arab naval vessels can be transferred from one port to another. Unifying the Arab navies' weapon systems will enable these navies to develop a unified doctrine and a common battle theory. They will be able to establish an integrated naval force with varied components, using the Suez Canal for deployment of the forces. (Saudi Arabia can transfer 8-10 vessels through the Canal within two days to reinforce the Egyptian navy.<sup>13</sup>)

These dangers require the navy to be deployed in the Mediterranean, with the Gulf of Eilat having less importance but still very significant from the strategic standpoint – i.e., preserving the link with the Indian Ocean and trade relations with Africa and the Far East.

In any situation of deterioration in the region, a rapid accumulation of at least 100 different fleet targets can emerge in the Eastern Basin of the Mediterranean, and particularly in the maritime expanse between the longitude of western Cyprus and eastward (the force ratios in missile boats are 10:1 in Israel's disfavor). The ability to sail in the international civilian shipping lanes would likely be exploited to attack the Israeli coast. The preparedness for attack has also grown because of the beyond-horizon missile launching ranges, outside the ranges of discovery and identification from the coastal area and from the aerial reconnaissance routes. These task forces can simultaneously launch many dozens of missiles, without dependency between them and without a need for control centers, but rather by coordination alone.

#### **Against This Naval Power Stands the Israeli Navy:**

Some 6,500 people serve in it, and its main offensive force is comprised of: three Dolphin submarines equipped with Harpoon missiles and 650 mm. torpedo diameter. These state-of-the-art submarines are economical in manpower (35 crewmembers) and three times larger than the *Gal* submarines (the previous type that the Israeli navy used). They have a capacity to remain constantly outside of the harbor and underwater, much longer than the *Gal* submarines (over a month). They can operate in deep water and near to the coast. Some of their equipment was developed and manufactured in the United States (periscope, torpedo, navigation system), but they have many systems that were developed by the Israeli defense industry, which makes their maintenance easier.

Their mode of operation differs from that of the *Gal* submarines, which was “decentralized” whereas the Dolphin's is interactive: eight consoles control the different

systems and constitute the command position in the attack phase, with the technical center being managed from there as well (maneuver, depths, operating the diesel engines, and charging the batteries. The E system MK-37 sign is manufactured by the German Siemens firm). As mentioned above, these submarines are equipped with Harpoon missiles and an American torpedo.<sup>14</sup>

The speed of the Dolphin is 20K, its maximum dive depth is 200 m, and its range is 4,500 km. According to foreign publications, the Dolphin can carry cruise missiles with nuclear warheads on its torpedo tubes.

The navy also has three *Saar 5* missile boats<sup>15</sup> equipped with eight Harpoon missiles; eight Gabriel II missiles; two *Barak* antimissile launchers; two *Aliya* missile boats each with four Harpoon missiles, four Gabriel missiles, and a Dauphin naval helicopter; six *Saar 4.5* missile boats having eight Harpoon missiles, six Gabriel missiles, and *Barak* antimissile launchers; and four *Reshef* missile boats with eight Harpoon missiles and six Gabriel missiles.

Most of the Israeli force is concentrated in the Mediterranean, whereas the Egyptian and Saudi navies are free to move without disturbance and concentrate their full naval force either in the Red Sea or the Mediterranean.

### **The Importance of Naval Control**

The dangers detailed above underline the importance of maritime control from Israel's standpoint. The arena in which Israel needs to achieve maritime control is affected by the shipping lanes from and to the country, naval and aerial capability above the sea, and maritime regions of strategic importance to the Arab countries and others (shipping lanes to the Suez Canal, shipping lanes to Arab countries in the Mediterranean and the Gulf of Eilat). This requires full and perpetual control of the Mediterranean from the longitude of the Suez Canal and eastward and southward of Cyprus, as well as in the northern part of the Gulf of Eilat.

### **Maintaining Maritime Control in Wartime Enables Achieving Strategic Objectives:**

1. Protecting the strategic infrastructure, which is dispersed in the "soft belly" near the coast in the center of the country
2. Helping the ground forces prevail by carrying out flanking course and landing naval forces; guarding the ground forces along the coastal axes; providing logistical assistance to the ground forces via the sea as an alternative to lengthy, obstructed land axes; and preventing enemy reinforcement with forces dispatched via the sea.

3. Striking enemy strategic targets along the coast, and cutting off his shipping lanes so as to deny him vital supply through his ports in wartime.
4. Maintaining the "second-strike" capability.
5. Maritime control enables keeping the maritime flank open, and distancing the sense of the front from the civilian interior as well as raising morale. It enables protecting the necessary infrastructures for conducting the war, preventing the opening of an additional front from the sea, and forcing the enemy to invest in forces and measures to defend his coast, a potential that is subtracted from his forces in the zones of contact with the Israeli ground forces.

### **The Powers' Involvement in the Region**

Since as far back as the War of Independence in 1948 Britain has supported the Egyptian navy, which relied on vessel infrastructure and maintenance by the British navy,<sup>16</sup> which also indirectly assisted the Egyptian navy's machinations against vessels laden with immigrants from Cyprus to Israel during 1948-1949.<sup>17</sup> In the Sinai War it was the French and the British who waged the maritime (as well as aerial) battle against the Egyptians after Nasser's nationalization of the Canal.<sup>18</sup> In the Six Day War the US Sixth Fleet and Soviet Fifth Fleet roamed in the region,<sup>19</sup> and the US spy ship *Liberty* was destroyed by the Israeli navy and air force after being mistakenly identified as an Egyptian military supply vessel.<sup>20</sup> In the Yom Kippur War a near-atomic war was prevented by the two superpowers' intervention in the region.<sup>21</sup> And in the 1982 Lebanon War the fleets of the two superpowers roamed in the region as well as French and British fleets, and the Israeli navy's boats were monitored from the moment they left the port.<sup>22</sup> It appears, then, that the powers' involvement in the region will not weaken and will even intensify in the future, if and when countries in the region use nuclear weapons that will also endanger European countries and perhaps even America.

### **The Structure of Israeli Naval Power and Considerations in the Process of Its Development**

Just in the 1950s the Israeli navy, at the beginning of the tenure of naval commander Vice Adm. Shmuel Tankos, chose destroyers as the primary naval vessel,<sup>23</sup> and in the 1960s, at the beginning of Vice Adm. Yochai Bin Nun's tenure, chose the missile boat (which would be the dominant force while the submarines would complement it,<sup>24</sup>) under Vice Adm. Ze'ev Almog's leadership in the 1980s the navy decided to maintain the same concept and continue developing surface vessels (*Saar 5*) as the primary force at the expense of submarines,<sup>25</sup> while

upgrading the missile boats with emphasis on attack and survival capabilities, which required newly increasing the boats after 20 years.

Over the years the naval force structure has been a focus of debates and vacillations regarding three emphases of development:

1. whether to build large or small surface vessels (destroyers vs. missile boats, *Zivaniit* vs. *Saar 5*);
2. whether to invest in aerial force as a substitute or as assistance;<sup>26</sup>
3. whether the submarines or the missile boats should predominate in the naval force.<sup>27</sup>

### **Preference for Surface Vessels as the Main Element**

Cumulative experience has shown that the main problem of all the platforms and systems that are capable of operating in the open maritime expanse (such as submarines or attack planes on shore-controlled excursions) lies in the achievement of **pinpointing and reliable identification** in the maritime arena, which is full of surface targets and underwater targets of different nations. Reliable identification is clearly a necessary condition for a decision to destroy, especially since the weapons used at sea, missiles or torpedoes, are fatal to most kinds of targets. Hence the conclusion that only surface vessels that are equipped with survival and attack systems, and are capable of permanently carrying above- and underwater sensors for reliable discovery and identification of “threatening” targets moving in beyond-horizon ranges, can constitute a suitable answer to above- and underwater threats.

The surface vessel can maintain, with sufficient continuity, clandestine monitoring of the shipping movements in a broad zone without exposing and betraying itself (by means of passive discovery systems). This means the surface vessel also has the capability to formulate and construct a maritime picture, based on which legitimate targets for destruction can be reliably identified. Furthermore, it also has the capability to skip quickly, with ongoing clandestine monitoring, from one zone to another and thus also to increase the scope of its control. And finally, a surface vessel with the above capabilities is also the most effective factor in compensating for submarines' limitations of control and attack capacity as they lurk near protected enemy shores. This is because the surface vessel that lingers near the same shores while remaining outside the direct threat of the enemy's defensive strip can continue to monitor or intercept enemy submarines or missile boats that go out to attack the Israeli coast, and on which the submarine has reported but is unable – for political or tactical reasons as well as limitations of speed and exposure range – to attack.

Thus it emerges that the navy must continue to rely primarily on surface vessels rather than submarines. And more specifically, the missile boat, as the navy's main surface vessel, will conduct the surface fighting in the expanses of the maritime arena with the aim of destroying enemy vessels that threaten Israel's coast and vital shipping. The missile boat's main targets are the enemy's surface vessels and, first and foremost, his missile boats. His main arena of battle is the open maritime expanse. Moreover, considering his main capabilities in the area of discovery, identification, speed, and his weapons' range of power, the missile boat constitutes the most effective instrument for "covering" the surface of the water between the enemy's ports and the Israeli coast so as to encounter and/or destroy any enemy vessel that has penetrated this maritime space and aims at striking Israel's coast or vital shipping.

Thus the missile boat is designed to fight against the main threat to Israel from the sea. Given its task of foiling or interdicting this threat, it is the critical factor in deciding the naval battle. It can, therefore, provide freedom of action and movement to naval forces in the maritime arena and enable the navy to accomplish a range of objectives, primarily assisting the land battle and safeguarding Israel's vital shipping.

The vulnerability of Israel's strategic infrastructure means the threat must be distanced beyond the enemy's maritime launching ranges in all situations. Those ranges are close to international shipping lanes, and in that regard provide concealment and camouflage and, therefore, give the enemy flexibility and freedom of action in firing missiles at the Israeli coast. The navy, however, because of difficulty in identifying the enemy, must be located close to him. Hence the special need for surface vessels with an ongoing capability to remain in the open sea; to discover and identify submarines, surface vessels, and aircraft from long ranges; to cover maritime expanses at high speed; and also to defend against anti-aircraft fire and missiles, assisted when necessary by offensive aerial force when sailing in vital maritime areas.

In wartime the missile boat will be vulnerable throughout the entire expanse of the Red Sea and will seek to avoid lingering in it. The sailing ranges of the missile boat in the Red Sea will strive to cover – without additional refueling – the distance as far as South Africa if the Suez Canal is closed, and the only way for the missile boat to demonstrate supremacy in this sea, because of its structure and its being closed and hostile, will be to move in that direction at relatively high speeds.

In the Mediterranean, the missile boat will have to maintain fighting capability in all the regions and in all states of readiness, and to rush toward the battle from a state of lingering in the lane – and not from the port.

In general, the submarine-missile boat ratio is not measured in numbers but rather in ongoing ability to remain in the sea, this being related to the surface vessel's optionality. The submarine is not a match for a surface vessel that advances toward it.

In addition, the "integrated warfare" (in which all the forces of the navy participate with aerial assistance) that the navy will utilize in the war points to the advantages and disadvantages of surface vessels compared to underwater vessels.

When the Navy commando Flotilla-13 acts in the ports, the submarine is in the harbors' entrances (to enable command and control of flotilla 13 actions – marking targets for the missile boats, which are in the open sea. Integrated warfare also enables a "horizontal force", such as the navy, to eliminate the possibility of "horizontal weakness" by concentrating effort at the necessary place and time.

#### **The Choice of the *Zivanit* (Hydrofoil) in the 1970s**

In choosing a small vessel such as the *Zivanit*, the same principles guided the navy as when it chose the missile boat instead of the destroyer in the 1960s, based on preparation for the future battlefield with the State of Israel first needing to clarify what it wanted from its naval arm (as Vice Adm. Yohai Bin-Nun claimed before the General Staff in 1962,<sup>28</sup>) so that it could be built on a large scale that would enable a suitable response:<sup>29</sup>

1. Choosing the main arena (the Mediterranean), where the main effort would be concentrated.
2. Choosing the main area of specialization – surface warfare.
3. Adopting an offensive concept that exploits local superiority (technological and qualitative) in light of the inherent quantitative inferiority, and that can exploit being centrally positioned between the two main enemy navies (Egypt and Syria) while creating local superiority in the internal lines against one of the enemies.<sup>30</sup>
4. Using small and economical vessels.
5. Improving the survivability of the vessels, given the reduction of the technological gap, by building a large number of vessels.
6. Using ports as "force multipliers".

7. Relying on aerial assistance: in defending ports or vessels in the open sea, against aerial reconnaissance for intelligence and counter-submarine helicopters, for amassing and constructing a maritime picture, and for attacking enemy vessels and ports.
8. Battle superiority (technical, weapons) of a single vessel vs. a single enemy vessel – a larger quantity of vessels is preferable to a variety of missiles.
9. Method of activating the missiles – firing missiles from more than one direction is preferable to firing a variety of missiles from one direction.
10. Survival capability – as a central factor in the success of the battle.
11. Simplicity and economy mean easier maintenance and higher capacity.

The *Zivunit* project that began in 1974 ended with the appointment of Ze'ev Almog as commander of the navy in January 1979. In August 1980 the navy decided to develop a versatile missile boat larger than the *Saar* 4.5 for both attack and reconnaissance functions, which would fulfill most of the functions of the navy. The main considerations in the decision to upgrade the missile boats (in the direction of the *Saar* 5) and develop a missile boat with higher attack, guarding, and survival capabilities were based on the earlier-mentioned factors of the aging of the navy's vessels compared to those of the Arab navies, the "shelf purchases" and procurement initiatives of the Arab navies in absorbing new Western and Eastern technologies, the development of the Arab navies all along the coasts (with defense based on long-range 100 mm. missiles such as *Sipal*, radar-controlled artillery, and an array of naval helicopters for fighting against submarines and attacking surface vessels), and a change in the maritime deployment vs. Egypt in the Mediterranean and the Red Sea (in the wake of the 1979 peace accords).

*Decisions were made to replace the main surface vessels* with new ones that were built for the navy since the mid-1950s (preferring "shelf purchases" of British model Z destroyers), in the late 1950s (purchasing British model S submarines), and in the early 1960s (building the missile boats instead of the destroyers and replacing model S submarines with the *Dakar* submarines that were built in Britain according to a German plan and were supplied in the latter half of the 1970s). Since then the *Saar* 2 and 3 missile boats that were built in Cherbourg shipyards in France have been upgraded to *Saar* 4 and 4.5 (helicopter-carrying). As noted earlier, in the mid-1970s a decision was made to build a large quantity of small, rapid missile boats (*Zivunit*-delete), and toward the end of the 1980s – with a gap of 12 years (twice the average time, which is between five and six years, for upgrading, building, or replacing the main surface vessels) – a decision was taken on the *Saar* 5. Building the force

was always a “chain reaction” to a threat that led to a new concept. It should be recalled that there is always competition for development and use in real time. The more expensive the systems, the more accurately one must anticipate the future because development is expensive and protracted and there is a risk that the equipment and the systems will no longer be suitable once they are ready.

Upgrading and renewal of naval vessels is also done under difficult conditions of budgetary constraint. Being in a protracted conflict, Israel is required to renew the force gradually and continuously given that temporary weakness could well be critical (as indeed occurred in the Six Day War of June 1967 when the navy was “stuck” with destroyers confronting the Soviet *Styx* missiles).

Maintaining the naval fighting force over time requires building it to be capable of exploiting the platforms and systems to their utmost operational reliability, and of developing and improving battle systems in the vessels so as to outstrip the enemy at any given moment. Uniformity of the system and an increased quantity of vessels (the concept that underlay the building of the missile boats and the *Zivani*t in the 1960s and 1970s) make the constant maintenance easier and enhances the vessels' preparedness and capability.

In dealing with these constraints one must take heed of the time axis and prefer a good and available solution to a better but later one. Building the force requires a protracted program of many years, which gives the decisionmakers flexibility of response to changes that occur in the enemy, to the foreseen changes in technology, and to budgetary constraints. It is wise, therefore, to advance rapidly in fields where one can realize an advantage. Cooperation with the defense industry creates a relative preference for the local industry in manufacturing weapon systems and integrating them into the small vessel. Primary weapons development in the local industry also enables maintaining teams of experts, who will be able to help the navy react immediately to technical problems that arise in wartime. This combination also helps in absorbing the lessons of war more rapidly in the technological area.

### **The Choice of the *Saar 5* in the 1980s**

Immediately upon assuming the post of commander of the navy in January 1979, Vice Adm. Ze'ev Almog made clear that the navy's objective and mission needed to be reexamined in light of future challenges. In his view, the navy needed to adopt an offensive approach.

This was not out of necessity (as in the Six Day War), nor in light of a rapid change (as in the Yom Kippur War), but rather as a system, aimed at “drawing” the enemy out of the ports. Almog believed that given the developing trends in the arena, and in the confrontation states

in particular, it was important to realize that the naval arena was widening: the Libyans would also be capable of attacking with submarines (having anchorages on the way); it was already impossible to stay long in the battlefield, mainly because of the weapon ranges (beyond-the-horizon missile fire); and the air force had a problem of discovery and identification mainly because of limited airtime, which also made it difficult to construct a maritime picture.

On the other hand, there could be greater capacity to remain in areas of “vital waters”,<sup>31</sup> from which one could skip about and concentrate effort wherever it was required (such as shifting between a southern and a northern arena in the Mediterranean in the Yom Kippur War). Because the navy was a small force, it needed a larger vessel that could carry systems capable of coping with the variety of threats. It was always desirable that the concept be antecedent to the means. In the 1960s, the concept was based on developing a weapon system similar to the threat (the *Styx* missile), and on the existing technology. This time, too, the navy had to aim for something similar; there was no novelty here.

Almog's assessment of the situation was summed up in a document he published in June 1980 titled “Objective and Capacities of the Missile Boat of the Next Generation”, which constituted a basis for characterizing the future missile boat (*Lahav – Saar 5*). The document include a detailed look at: the developmental trends in weapon technologies in the maritime arena, the forces and threats in the region of the Eastern Basin of the Mediterranean<sup>32</sup> and the northern Red Sea that were relevant to the State of Israel, and the factors characterizing the arena and affecting warfare in it.

The document also spelled out the objective and mission of the navy, the capabilities required for their realization, and the battle concept as a corollary. From the concept developed the rationale for the main battle vessel in the force, its objective, and its nature in terms of analysis of the arena and the capabilities required of it in such an arena.

In the document Almog claimed that not only had there been a significant acceleration in the strengthening of the Arab navies, but also considerable development in the range of their missiles and their procurement capability. To exploit the range of the missiles, which had grown to 100 km., i.e., beyond the horizon, there was a need for means of discovery, identification, and target marking for the boat launching the missile, i.e., the helicopter. Thus a need emerged for a boat capable of carrying a helicopter in a suitable fashion (including storing it during prolonged sailing on the sea) and maintaining it. At first the solution was to lengthen the *Saar 4* missile boat, on which a garage and a surface for a helicopter were built (the *Hahit* missile boat). This change, however, led to significant instability under certain maritime conditions and a need to sacrifice a 76 mm. cannon, three Gabriel launchers, the

capability to carry flotilla 13's special underwater equipment, and also the possibility of installing defensive counter-missiles/airplanes systems to the extent required, as well as UAVs for observation and pinpointing the weapons in the future.<sup>33</sup>

The need for numerous and varied systems so as to answer the array of threats the missile boat would encounter in the maritime battlefield required, therefore, greater bulk and weight than existed at present in the *Saar 4* boats. According to Almog, such bulk and weight could enable carrying flotilla 13 weapons without limiting or neutralizing the boat's operative capability as a missile boat. Such a boat would therefore become versatile for a variety of naval tasks. This meant, of course, remaining on this platform to enable absorbing new and innovative systems and options during the entire life span of the missile boat, including active antimissile instruments (Hard Kill) such as the Phalanx heavy cannon.

In light of the three above requirements (a helicopter, systems, and active counterinstruments), a need emerged to build a large boat of about 800-900 tons (compared to about 450 tons for the *Nadran* or 488 tons for the *Saar 4.5* – the *Hahit*). The boat's survivability, particularly in the future, would no longer be affected by its small size or its speed or capacity to maneuver, given the smart missiles that would also be capable of homing in on a small target. Thus, the limitation entailed by a large boat in the past was offset. The boat's greater size meant its survivability improved in light of its ability to carry and operate the active counterinstruments, which a small body like the *Zivanit* could not carry.

According to Almog, the required speed for the future missile boat (*Saar 5*) was an operative speed of over 30 kt., sustained over time – so as to enable rapidly moving to the battle arena and from one battle arena to another – and not a tactical speed<sup>34</sup> as required in the past for the offensive missile boat.

Almog's concept also had many opponents, who focused mainly on the high cost of the project and their concern that this cost would reduce the number of boats the navy could build, which would lead to an obsolescence of vessels in the 1990s.<sup>35</sup> They claimed this would also lead to reduced operative flexibility for the force, such as concentration of forces to create local numerical superiority. Moreover, the relative weight of a single boat within the force would be high and a blow to it would cause great damage to the whole naval force, while also damaging the decisionmakers' desire and ability to approve any offensive concept. This, in turn, would lead to repression of initiative and boldness in the force's operations, which are required for striking the enemy immediately at the opening of the war.

Despite the debates and the opposition within the force and in the defense establishment, Prime Minister Menachem Begin, as defense minister at the head of the Council of Ministers

for Security Affairs, approved carrying out detailed planning on the *Saar 5*. Subsequently there were many delays, up to September 1984 when the status of the *Saar 5* was presented to then Defense Minister, Yitzhak Rabin, (the fourth time the project was presented to a defense minister). That same year the Americans approved the “development package” for building missile boats in the United States and submarines in Europe and Israel. In 1986, Defense Minister Rabin leaned toward giving priority to building the submarines, but an examination that was conducted by the US Defense Secretary’s assistant, Dov Zakheim (Caspar Weinberger was the Defense Secretary), restored the preference for the missile boats. During all the years he served as Chief of Staff (1983-1987), Moshe Levy warned of a danger to Israel of blockage from the sea and prevention of the arrival of supplies (raw materials, fuel) for four to six months, and this even without a declaration of war. Thus, Levy stated that defending the coast with coastal-missile batteries constituted a waste of resources and was inefficient given that the air force could not act as substitute for the navy, whether in tasks of protecting the shores or of safeguarding shipping, because of factors of ranges, identification, armament, and weather.

The project was finally approved in 1988, but the construction in the United States was initially delayed until 1992 (overall, 12 years passed from the approval of the project’s operative nature to the beginning of operation), mainly because of the dispute about the priority of the *Saar 5* project over submarines.

The first boat arrived in 1994 (the same time at which the construction of three Dolphin submarines was approved in Germany, with German and American funding).

Almog’s determination to go ahead with the project also stemmed from his awareness of the navy’s need to use the *Saar 5* as a platform for strategic weapons with implications beyond the naval warfare dimension.<sup>36</sup>

In comparing between the *Shalechet* project (the 1960s missile boats), the *Zivanit* (the 1970s), and the *Lahav* (the 1980s), great similarity emerges on the main points:

1. An idea that grew out of the navy that succeeded in itself in persuading the establishment.
2. New ideas about the naval composition of forces that were ahead of their time.
3. The navy’s ability to improve existing systems (e.g., the optical driving technologies of the Gabriel naval missile, which were better than the “launch and forget” technology of the Soviet *Styx* in terms of electronic warfare; or the use of missiles in the open sea and their integration into the battle doctrine).

4. Budgetary constraints that prolonged the projects for years.
5. Internal disputes in the force about the image, nature, and role of the navy in the IDF's security concept. To this day there is no consensus on these matters among the senior and retired personnel of the force.
6. The navy's autonomy within the defense establishment as a professional force; this is a sort of "black box" that the general staff and relevant actors in the defense establishment do not know how to relate to.
7. An effect on the development of advanced technologies in the Israeli defense industries (on armament systems, electronics, discovery and identification, propulsion, and so on).
8. The need to involve political actors within the defense establishment and on the governmental level in approving and rejecting projects.
9. The special status of the commander of the navy as the commander of a branch that has direct access to the head of the political-defense echelon, namely, the Prime Minister.
10. Utilizing foreign technologies as well as Israeli technologies, which necessitates forging ties with foreign industries, acquiring knowledge and skills in foreign navies, and, for maintenance, relying at first on foreign navies and foreign industries.
11. The naval battlefield is "advanced" and transparent to all, and there are no secrets within or between the Western navies, especially now that the sole superpower, the United States, dominates the world arms market.

#### **Development of the Dolphin Submarines: An Outgrowth of the Development of the Underwater Battle Doctrine of the Late 1950s**

The traditional emphasis in building the navy's force was on surface vessels. In the 1980s the force had more than 20 missile boats and only three submarines, and in the force's new program a similar ratio is supposed to be maintained. But does such a ratio between surface vessels and submarines fit the anticipated developments in military technology and in building naval power in the region? Or, instead, is a change required in the navy's traditional structure?

The opponents of the *Saar 5* project regarded building more submarines as a solution for the naval composition of forces. Their main claim was that the growing density of (discovery-~~delete~~) detection and pinpointing systems would limit the operability of the above-water

vessels and require a recourse to underwater vessels. The advantages of the submarine in the maritime arena, and in the Eastern Basin of the Mediterranean in particular, involve its great potential for performing an increasing proportion of tasks, from intelligence and deterrence through disruption and destruction. This potential is particularly large in regard to the Israeli navy, for a number of reasons involving the force's technological superiority and its relative advantage in terms of crews' and commanders' skills, and in operations that require boldness, initiative, and originality. To this must be added the relatively amenable conditions for using submarines in the Mediterranean arena. Wise use of the submarine force by the Israeli navy could both enable it to hit the Syrian fleet hard at the mouths of the harbors and, to the extent necessary, to operate in the center of the Mediterranean (to deter the Libyan fleet).

At the same time it should be recalled that to derive operational benefit from the submarine force, especially when naval victory must be achieved rapidly at the outset of the war, one must maintain a large number of submarines in the composition of forces that can be injected into the battle at any moment. It is reasonable to assume that maintaining a constant presence of submarines in an operational activity requires a large number – threefold – of submarines in the composition of forces. Although in the operational ranges of the Israeli navy this ratio may in fact be slightly lower, still the number of submarines in the composition of forces must be double so that they can be used in the operational activity at any moment (i.e., six submarines rather than three).

Generally speaking, a combined analysis of the conditions in the arena, the enemy, the technology, and the expected developments in these areas leads to the conclusion that submarines must be given greater importance as an element in the Israeli naval composition of forces. To be sure, the navy cannot achieve all of its objectives with submarines alone, but still it must have at least double the number of submarines included in the navy's composition of forces, enabling a constant presence of submarines in the sea.

Essentially, since the decision to establish the submarine force in 1958 (and by an uncommon preference of the then-Chief of Staff, Chaim Laskov),<sup>37</sup> it has always been a political weapon. Hence the generals preferred to "ignore" the need to invest in it each time they began to discuss the IDF's budget for the coming year or years (in the different armament programs: "Bnei Yaakov," "Hashmona'im", and "Bnei Or" in the 1960s).<sup>38</sup>

In Almog's period, the period of the Gal<sup>39</sup> submarines, he guided the submarine fleet (Fleet 7) according to three principles:

1. The submarine is not a guard boat, or for warfare only against submarines.

2. Operating with zero foul-ups.
3. Lurking only in the waters of the enemy.

When these principles were implemented, the general staff headed by Moshe Levy reversed its course from near-operational neglect to seeing the submarine as the be-all-and-end-all; hence the intensive use of the submarines in the intelligence system and in the activities of Fleet 13.

After Chief of Staff Rafael Eitan approved the building of three state-of-the-art submarines at the beginning of the 1980s, and Defense Minister Ariel Sharon (again, the political echelon) increased this to four submarines, Chief of Staff Moshe Levy decreed in the 1986 multiyear program that the navy would in the coming 10 years be equipped with eight *Saar 5* missile boats and six submarines. At that time Gen. (ret.) Yisrael Tal asserted that submarines as a strategic weapon had priority over the missile boat. Vice Adm. (ret.) Alex Tal stated at the end of his service, as the commander in chief of the navy: "In this era, the submarine component will grow because these are the instruments that are best able to exploit strategic depth."<sup>40</sup>

As commander of the navy in 1979-1985, Almog took a decision on building a new set of missile boats and submarines that would also be platforms for strategic weapons, but did not succeed in convincing the helmsmen of the state to go along with this.

The process of formulating the character and planning the development and manufacture of the Dolphin submarines of the next generation was essentially similar to that for the *Saar 5*. The foreseen end of the use of the *Gal* submarines at the beginning of the 1990s already raised, at the beginning of the 1980s, the need to renew the composition of forces of the submarines while integrating them into the future battlefield and providing an appropriate answer to the threats of the 1990s and onward. Here, too, the process was extended 10 years and longer from planning to execution.

Already in the 1960s Yosef Dror, father of the IDF submarine force, and navy commander Vice Adm. Yochai Bin Nun wanted to use the submarines for firing missiles at the coast (they spoke of ballistic missiles, since the issue of missiles for a surface battle did not yet exist and thought did not tend in this direction).<sup>41</sup>

Nevertheless in 1989 the General Staff, under pressure from then-Deputy Chief of Staff Ehud Barak, decided to cancel the building of the new Dolphin submarines out of budgetary constraints, and instead to extend the life of the *Gal* submarines for another five years. Ironically enough it was the ruler of Iraq, Saddam Hussein, who rescued the navy by

attacking Israel with Scud missiles during the Gulf War of 1991. This assault, which occurred on the background of information about the massive German assistance to Iraq in developing its missiles and also in building its chemical and biological arsenal, led the German government to try to “compensate” Israel, and improve Germany’s image in the West, by agreeing to build Israeli submarines in a German shipyard in the summer of 1991. The shipyard was, moreover, on the verge of bankruptcy and the project gave it a vital lifeline, thus solving a difficult economic and political problem for the German government.

The *Dolphin* and *Leivyatan* submarines arrived in Israel during 1999, the *Tekuma* submarines about a year later. Thus the navy’s submarine fleet moved to the technological forefront of the 21<sup>st</sup> century.<sup>42</sup> These were no longer “shelf submarines” – like those that were acquired in the past from the existing stock of submarines of the Western countries – but rather a sophisticated and lethal weapon, tailor-made precisely to the attributes and needs of the Israeli navy. Today the three submarines already form the backbone of the underwater forces of the State of Israel and will be among the most effective means of deterrence. Over the years of development, the planning of the submarine underwent a reexamination in light of the new threats that Israel faces, the technological developments in the world, and the new tasks that are required of the force.

The Dolphin type is the submarine that is designed for long-term fighting. It has capacities to dive for a long time, and to spend long periods distant from the mother port. Another advantage of the new submarine is a battle capability in ranges close to the coast as well, while the torpedo it uses (MK37 E) and the Harpoon Sub missiles make the submarine an even more lethal weapon than the missile boats, and a potential strategic weapon system. Today both Israel and Egypt already have a capability for firing Harpoon missiles from their submarines. And in the near future, according to different sources, Israel will also have a capability to fire cruise missiles from submarines.

Just as today the nuclear submarines carry the main burden of the nuclear system that maintains the stability of nuclear deterrence between the superpowers, so long as the battle capabilities against them (ASW) have not been improved, in the future they will also continue to enjoy a comfortable ratio exchange between the protection of the ballistic missiles that they have (reducing noise, increasing speed, launching from a longer range, and longer immersion time) and the means needed to neutralize them, which will require a sophisticated system, highly reliable and coordinated, whose development and manufacture will entail a considerable expenditure of the national resources. And just as the atomic nuclear submarines can fire their missiles from underwater and from close to the coast of the homeland, they also

are camouflaged and protected against enemy submarines, concealed before a nuclear attack while having a capacity to survive during and after a nuclear attack, and are actually bases of underwater launching. Thus the Dolphin submarines as well can operate and enjoy the same ratio exchange of defense and of attack and survival capabilities vs. the enemy missile boats and also, in the future, vs. the Arab, or Iranian, nuclear deployment given the stability of nuclear deterrence between the countries of the region. It is important, however, to be the first to do this.

In actuality the submarine force did not develop as Vice Adm. Yochai Bin Nun desired<sup>43</sup> and the navy preferred to rely on surface vessels, and primarily the missile boats. However, when the development of the Dolphin submarine was decided upon there is no doubt that in the navy, as well as the IDF, the concept that viewed it as the strategic arm of the IDF already held sway. The person who helped greatly in advocating and promoting the development of submarines as the “long arm” of the State of Israel was Gen. (res.) Yisrael Tal (who continued to fulfill senior positions in the defense establishment after retiring from the IDF). Defense Minister Rabin and Chiefs of Staff Shomron and Levy were persuaded.

However, despite the approval of the submarine project and their actual construction, it was only in 2002 that the Chief of Staff and Defense Minister approved that the navy would discuss developing a strategy for utilizing the force within Israel's strategic depth so as to develop a “second-strike force”.

### **The Navy: The Long Arm of the IDF, through a Change in the IDF's Battle Doctrine**

In the latter half of the 1980s Israel entered a situation requiring it to change its security concept and the deployment of the IDF according to the guidelines of an updated military doctrine, so as to enable a reasonable level of national security. The Israeli battle doctrine is based on achieving a perpetual military advantage over its enemies, despite its inherent inferiority in terms of the asymmetry in quantitative force ratios between the sides.

Four factors have fostered the need to update the Israeli battle doctrine:

1. Economic constraints;
2. The anticipated erosion ratio in the future battlefield;
3. Exhaustion of the potential of the present weapon systems;
4. The closing of the technological gap between Israel and its neighbors.

These factors compelled the IDF to adopt a new battle doctrine that is based on the weapons that will be needed to solve problems of erosion ratio on the future battlefield and

will compensate for quantitative inferiority.<sup>44</sup> These instruments, including weapons with precision-guided ammunition, have been designed to strike the battle systems of the enemy in his territorial depth. The available technologies in the areas of precision-guided ammunition provide an opportunity to develop battle systems with attributes that enable achieving these operational objectives.

The success of the implementation stage for the precision weaponry system in the task of destruction depends on a sophisticated system of reaching targets in real time, and on an advanced system of control and monitoring in the entire battlefield. The required technology for achieving this goal exists, both in underwater vessels and certainly in the case of surface vessels. Destroying a considerable portion of the enemy's weaponry in the future battlefield by using precise and reliable battle systems makes it possible to manage with a limited quantity of such systems while at the same time reducing the IDF's composition of forces. In the long term the new doctrine will enable reducing the defense budget.

The potential scenarios that will require or "prefer" using the navy as the "long arm" of the IDF are:<sup>45</sup>

1. A state of all-out war with all or most of the Arab countries resembling the wars of the past; in this situation, naval activity will save on aerial force in distant ranges and prevent its diversion from the main arena of battle.
2. Half-peace, half-war with ongoing low-profile activity; in this scenario there exists room for activity at distant targets, as well as the force and the instruments that can be dispatched for the appropriate time span. This may be the typical time span in which the long naval arm is likely to be required.
3. Peace with the countries bordering Israel and a formal state of war with distant countries that fight against Israel or activate terror within her borders or anywhere in the world against Israelis or Israeli institutions.
4. A state of lukewarm peace – in such a case as well, there is room for the sorts of quiet actions that are anticipated in a time of peace.

**The navy's ability to act in confrontation states and peripheral states as the "long arm" of the IDF** is based on the existing technological development in the IDF and the navy, on the naval battlefield and the relevant naval arena, and their connection to the equations of national security (deterrence, warning, and rapid victory). This is also the basis for developing strategic capabilities for a "distant response". The navy can activate a long arm from the sea

in routine times and in war for offensive missions, combined missions, assistance, and intelligence.

The maritime range has advantages in terms of distant ranges, changing weather conditions, and politically uncertain conditions. The maritime range offers good access to value (strategic and tactical), civilian (national-infrastructure, economic, governmental), and military targets, including in contexts where the ground and air forces are limited. The decisive advantage is manifested in the dimension of range, time of lingering, size of the force that can be mobilized, flexibility in the timing of the action, and in the ability to preserve its secrecy even after execution.

The development of the special capabilities from the sea, and especially from submarines, points to the navy's ability to act in distant arenas and to respond to threats from peripheral countries, **which indicates its ability to serve as the future deterrent weapon of the State of Israel.** The fact that the Egyptian ports, Alexandria and Port Said are on the seacoast, and Cairo about 200 km. from the sea (compared to 400 km. from the Israeli border), may have been a key factor in decisions on developing long-range weapons for the navy. The navy could also be integrated into, and even lead, a military action combining attack helicopters/*Saar* and/or UAVs for purposes of attack, assistance, intelligence, or special missions against strategic targets and objectives in a distant arena of activity.

The integration of the navy into the "long arm" of the IDF involves:

1. Attacking quality targets with battle helicopters;
2. Attacking quality targets with a Unarmed Aerial Vehicle (UAV);
3. Transporting and landing of forces and battle and intelligence equipment on land and sea by helicopters or sailing vessels;
4. Actions of the Naval Commando;
5. Refueling and supply of helicopters close to the targets;
6. Emergency landing for helicopters;
7. Rescuing ground/naval forces and collecting equipment from the target and close to it with designated helicopters/surface vessels.
8. Collecting technical intelligence with boats and with UAVs that are controlled by naval vessels (surface and underwater)
9. Collecting technical intelligence (photographing, observation, scanning) by day and night with UAVs and monitoring them with naval vessels (surface and underwater).

The maritime venue, and the platforms that can be used from the sea as advance or alternative bases that are at the IDF's disposal in routine times or wartime, will enable the IDF to multiply force and to provide strategic backing in cases where there is no other alternative.<sup>46</sup> The offensive tasks will be executed by using up-to-date weapons that are suited to long-range missions against land or sea targets (including selective attack at sea to prevent the arrival of vital cargoes to enemy states). The relevant kinds of armament include: unmanned platforms, missiles for the appropriate range with capabilities of: precise navigation, homing, and control from naval vessels, including communication ranges for purposes of control. It is also possible to use small combat forces for purposes of attack/destruction of quality/economic targets and infrastructure, with means of self-armament or counter launching. These actions can also be executed from a submarine, including the firing of special weapons, and the use of special weapons on the coast at the desired time.

The navy as the "long arm" of the IDF creates the alternative infrastructure of the future, along with cultivating the battle readiness that can maintain naval superiority. In the view of the current commander of the navy, Vice Adm. **Yedidia Yaari**, the naval vessels must be multipurpose (fit for aerial combat, assistance to aerial monitoring and anti-aircraft; in ground warfare – firing of cruise and sea-to-coast missiles; in maritime warfare, having survival capacity and counter-submarine capability) at the expense of single-mission vessels such as the *Nirit* (the *Saar* 4.5, mainly for naval warfare).<sup>47</sup> Today the debate about strengthening the navy has shifted to allocating resources between air, ground, and sea, and to flexibility in accepting the changes. At present, naval weaponry's accession to the center of the future battle arena constitutes a turning point that requires the overthrowing of conventions.

This is the greatest change in the navy in the five decades during which the naval battle doctrine has developed. Whereas since the inception of the IDF the air force became the main element in the decisive battle on land and in Israel's deterrent power, the navy was pushed into a corner as a marginal force. The performance of the navy in the 1973 Yom Kippur War, however, demonstrated that one can achieve a naval capability for victory. Since the late 1990s the navy has been integrated into the main, decisive battle with precise, sophisticated, long-term weapons and is ready to move to the next stage – its participation as a central factor in conventional and non-conventional Israeli deterrence.

### **The Future Naval Battlefield: Toward Ground-to-Ground Missile Warfare**

To the extent the navy succeeds in maintaining its qualitative and technological edge and effectively creates local superiority enabling it to triumph in the naval battles, it will change in

the next war from an arm **assisting** with victory on the ground to an arm **participating** in victory on the ground.

The navy's current strategic infrastructure, which is based on the *Saar 5* missile boats and the Dolphin submarines, is a central element in planning the construction of the force and in the chosen strategy. This infrastructure enables the navy to fulfill its traditional objectives of defending the country's coast and vital shipping lanes, together with capabilities of attack and threat against enemy fleets and anchorages, while also developing a naval strategy in which the navy will constitute the "long arm" of the IDF in the era of ground-to-ground missile warfare, as assistance or as a replacement to the aerial and ground forces. Thus the navy, in the next war, will act in the framework of a new battle concept in which it will participate first of all in the ground campaign in light of the ground-to-ground missile threat, and its main contribution will be in directing precise fire from the sea at infrastructure and strategic targets. Future warfare will occur in three dimensions: sea, air, and ground, with all the forces using the same basis of data and communication, and capable in real time of synchronizing their actions in the three dimensions.<sup>48</sup>

This is combined, inter-force warfare, in contrast to classical naval warfare that is isolated in its "organic arena" (that is, acting according to the limitations and advantages of the above- and underwater vessel, and cut off from the ground and air forces or with aerial assistance).

The center of gravity is still on the ground, but with crucial participation by the navy as it joins the two main forces, air and ground, in combined triple-force warfare (and not, as up to now, air-ground only). Thus, in the next war the navy's operative demands will be: to balance its capabilities between surface and underwater capabilities; to maintain naval superiority even in difficult conditions in the naval battlefield (adopting an offensive concept from the start), parallel to the main endeavor on the ground; to distinguish between an "in-depth naval warfare" system (achieving naval supremacy and participating in the ground battle) and warfare whose only purpose is to defend the sovereign waters, with each system having a capability that is autonomous and independent of the other system's capability to function.<sup>49</sup>

**The problem was, and remains, the navy's budget within the defense budget.** In the decade of the 1990s as well, the navy's budget did not rise much above the traditional 7% of the defense budget. Even in the 2002 budget the navy's allocation has not increased, testifying to the fact that despite the awareness among senior figures in the defense establishment of the growing importance of the naval arm, this still has not been expressed in the necessary, substantial increase in allocations for future equipage.

The second acute problem that must be taken into account is that in the next war, the strengthening of the Arab navies and the force ratios, as we described at the outset, will make it difficult for the navy to achieve control and to maintain maritime superiority. (This is also because of the resulting technological gaps and relative advantages in missiles, in the active and passive electronic systems, and in the quality of the platforms, meaning by radar capability of detecting our vessels.)

Thus, while the navy builds grandiose war plans of cooperation with the other arms with an eye to ground-to-ground missile warfare and assisting in the decisive ground battle, it will absorb defeats in the naval warfare to the point of risking the destruction of its forces. Thus the future naval battlefield does not in fact ensure preserving superiority so as to be "available" for further tasks that are not purely naval, and all the planning for the future is liable to collapse like a "house of cards". If the quantity of modern, *Saar 5* missile boats does not increase and instead remains at three boats, the navy, facing future threats, will probably need more massive aerial assistance in offense and defense, and will have difficulty assuming an offensive strategy from the start as it did in the Yom Kippur War.

### **The Required Change in the National Security Concept**

To the extent that the Middle East becomes multipolar nuclear, as security experts expect to happen in the next five to ten years as Iran, Iraq, and subsequently other hostile Muslim states join the club of nuclear-equipped countries (such as Egypt and possibly Libya), a change in the IDF's battle doctrine and entire security concept is required. The assumption is that the coming wars will be wars of attrition in the era of conventional missiles (see the Iran-Iraq War in the 1980s and the Gulf War in the early 1990s), or very brief in the nuclear era.

Today the satellites reveal everything and nothing can be hidden,<sup>50</sup> and in the missile age the sea and the land are equally threatening. The relative advantages are found in the capacity for concealment, camouflage, and mobility in the face of the initial attack. The warfare arena is composed of the ranges of weapons, part of it being at sea and part of it on land. No longer are there clear land-sea boundaries; the missiles, with their enormous ranges of fire, have blurred this line.

Gen. (ret.) **Yisrael Tal** maintains that the air force, while important, can no longer serve as Israel's exclusive deterrent factor and strategic basis. Therefore, the navy must today become part of Israel's security depth. The navy's role must change as well: no longer an assisting arm, but an arm of strategic deterrence.<sup>51</sup>

In the nuclear age, as the US and Soviet policymakers learned already in the 1950s, the only effective way to prevent the launching of missiles is deterrence. Deterrence is also one of the mainstays of Israeli strategic thought. Whereas the effectiveness of the Arrow system, which currently is supposed to provide us with the answer to the conventional and nonconventional ground-to-ground missile threat, is in doubt,<sup>52</sup> and with conventional power losing its capacity to be the only answer to Israel's security problem (see the Gulf War in 1991), Israel's deficit, at least in terms of its image in the world, appears to be a fact.<sup>53</sup>

## **The Nuclear Threat and the Naval Response**

### **The Threat**

Considering that Iraq, Syria, Egypt, Saudi Arabia, Libya, and Iran are equipped with a considerable stock of long-range ballistic missiles, Israel's imminent deficit constitutes a very grave existential threat, unlike any the Jewish state has known since its establishment.

Unlike in the case of the superpowers, which theoretically were able to absorb heavy nuclear blows and still continue to exist, the heart of Israel – its centers of population, industry, infrastructure, and so on – is concentrated in a triangle between Tel Aviv and Haifa that is about 100 km. long and 20 km. wide. Furthermore, a nuclear strike to the Greater Tel Aviv area, in a range of about 20 km. by 5 km., would likely deal a death blow to the State of Israel.<sup>54</sup>

The missile attack in the Gulf War (in 1991) convinced the country's leaders of the need to prepare for an existential threat.<sup>55</sup> The ground-to-ground missile fire revealed the fact that Israel (like the rest of the armies in the world) does not have a specific technological answer to the launching of missiles. Israel also has political limitations in making an appropriate response (operational as well, given the distances). The fact that Israel could be attacked in the interior without the IDF fighting in the front put the IDF in a perplexing situation. The country's deterrent capacity was eroded – not in terms of aerial attack and nonconventional weapons, but in terms of conventional ground-to-ground missile fire, which next time is likely to be nonconventional. This fact has influenced accelerated procurement and increased armament among the regional states, so that since the Gulf War the missile threat to Israel has grown along with the temptation to use ground-to-ground missiles as an answer (equalizer force) to Israel's military superiority. By using ground-to-ground missiles the Arabs can close qualitative gaps and thus again erode Israel's deterrent capability and hit its military and economic infrastructure at the outset of the war, thus paralyzing its capacity to respond.

The firing of missiles from Iraq in fact adds to all the (Arab – delete) countries hostile to Israel a second circle of “confrontation states” (Libya, Saudi Arabia, and Iran) that can take part in a war without bothering to dispatch task forces, aircraft, and the like; thus the threat to Israel is several times greater.<sup>56</sup> The missile ranges are likely to reach 2500 km. and more<sup>57</sup> and to cover every point in the State of Israel. The arms industries of Russia, Germany (including illegal activity), North Korea, and China are involved in developing these missiles, whose ranges are likely to double and increasingly to threaten Europe as well.

### **Developing the Second Strike<sup>58</sup>**

Beyond all these vital strategic uses, there is no doubt that the domain in which the navy can serve as Israel's primary strategic arm, similar to the existing situation among the powers, is the nuclear domain and first and foremost the submarines.<sup>59</sup>

Despite their enormous territories the superpowers, the Soviet Union and the United States, relied to a large extent on nuclear weapons positioned on submarines.<sup>60</sup> Up to 1989 when the Soviet Union collapsed, the large majority of the United States' nuclear warheads (SBLM) were installed on submarines, 30% in the air and 20% on the ground.<sup>61</sup> Britain, for its part, placed all its nuclear attack force on submarines,<sup>62</sup> and France also placed almost all its ground-to-ground ballistic attack force on submarines. India as well, which does not suffer from territorial problems like Israel's, places part of its nuclear deployment on submarines.<sup>63</sup> The reasons for this are clear: submarines are the most difficult to locate compared to ground and airborne missiles, and whereas aircraft have limited time in the air, submarines can do reconnaissance missions for a considerable length of time and, moreover, fire their nuclear missiles from the depths of the sea, which makes it particularly difficult to locate them. Therefore, submarines have the best capabilities to deliver the “second strike”. Today the Israeli navy has the technological capabilities to achieve the second strike from the sea, and Israel's operative strategic depth is the *maritime space*.<sup>64</sup>

### **Strategic Depth**

Louis R. Mortimer maintains that up to 1967 Israel's security concept determined that, because of the state's narrow borders, it always had to attack first. With the 1967 war the strategic depth changed, and so did the strategic response in regard to the defensive element. The 1973 war partly demonstrated this when Israel preferred to wait and not to attack first, was surprised, but also was able, because of the areas it had conquered in 1967, to win the war. As far back as 1981 Sharon, then Defense Minister, warned that the combination of the technological improvement and the mobility of the Arab armies together with the increased range of their ground missiles (SSMS) again required different strategic thinking based on the

fact that the territories no longer produced strategic depth, and Israel was facing the same dilemma that existed before 1967, namely, that it must be the one to deliver the first strike and to create deterrence against the potential use of these missiles. This was particularly evident after the Iraqi use of SSMS against Iran in the 1980s and against Israel in the Gulf War.<sup>65</sup>

### **In Practice**

The Commander of the navy in the late 1960s, Vice Adm. (ret.) **Avraham Botser**, also argued since then that the combination of the water temperature conditions, which make the Mediterranean relatively amenable to submarines, and submarines' capability to fire cruise missiles makes them a strategic asset and not just an operational one: "submarines should be an instrument of the State of Israel and not of the navy alone," he said in an interview in January 1998.<sup>66</sup> "In the world, submarines serve in the deterrence system vs. the use of nonconventional weapons. They are an instrument that ensures the enemy will not be tempted to mount an advance attack with nonconventional weapons, and come out of it unscathed." Accordingly, Vice Adm. (ret.) Botser recommended developing the submarine force, both for purposes of maritime warfare and also *for the State of Israel's strategic depth*. Botser was so convinced of submarines' indispensability as a strategic arm that he proposed replacing the entire coastal deployment with submarines. In his view, there should be eight to nine submarines in the IDF's composition of forces with three of them always at sea.

The navy's advantage as an important future component of Israel's conventional and nonconventional deterrence lies in its ability to move along the entire expanse equipped with long-range missiles having specific action capability and great power, which indeed constitutes an advantage over the air force. The survival capability of the naval vessels, and particularly the submarines, is due to their capability for mobility and particularly for concealment and survival, and their ability to operate beyond the ranges of the enemy's weapons.<sup>67</sup>

Exploiting the naval platforms as an accurate protective weapon on the one hand and as control over the sea on the other will keep the shipping lanes open – the shipping lanes having a central function in any future war – while keeping supply lanes regular, these too become more important under the principle of survival. Vice Adm. (ret.) Tal said upon the conclusion of his service in January 2000:

...in the strategic depth at sea there is everything that is needed to produce threats of all kinds without being exposed...the Dolphin submarines, for example, have tubes for ejecting ammunition...one can use them to fire a torpedo, mines, missiles, or any means that the diameter of the tube allows. The Americans also fire cruise missiles. This is a

development that we observe, monitor, and understand...anyone can interpret a potential as he wishes...<sup>68</sup>

The country's leaders, and particularly **Shimon Peres**, long ago reached the conclusion (especially after the Gulf War in 1991) that in the new strategic situation the naval arm has an advantage over the other arms and the most effective answer. The new situation indeed also requires reexamining the security concept. According to Peres, who served as director-general of the Defense Ministry under Prime Minister and Defense Minister **David Ben-Gurion**, this concept, which asserts the importance of naval strategic depth, was backed by the father of the State of Israel.

Actually, Vice Adm. **Bin Nun** was appointed commander of the navy out of an intention that he would develop the submarines as a strategic arm of Israel in the future battlefield. Back then, in the early 1960s, when the Americans were beginning to rely increasingly on submarine-borne nuclear weapons, this is what was anticipated. He personally promoted the issue because he saw in it the "map of the future". The possibility of receiving nuclear submarines from the Americans, as the French did in the 1960s, looked impractical to him, also because the French had signed the NPT convention whereas Israel, which denied it had nuclear weapons, had not signed. The Americans could not widen the "circle of Israel's nuclear capability", and it was sufficient for Israel that they "looked the other way" in the existing situation. In Peres's view the "second strike", under Israel's geostrategic conditions, can be executed *only* from the sea. And the development of the capability "will calm the environment, and will give Israel the 'deterrence' she needs for her self-defense."<sup>69</sup> If Israel develops a submarine-borne nuclear capability, she will be the sixth country in the world to have such a capability. Even though Israel as a small state will never be able to enjoy a wealth of nuclear weapons as the great powers possess, with its naval vessels and maritime strategic depth she will be able to create a situation where her enemies believe that if they suddenly attack a target for destruction they, too, will be destroyed.<sup>70</sup>

The following elements contribute to producing a second-strike force:

the variety of launching systems, their quantity, their capabilities for mobility, their dispersal in an attack, their camouflage, and their secrecy. The submarines have the maximal scope of these advantages so long as there is no breakthrough in antisubmarine warfare (ASW). Likewise, executing the second strike from the sea and not from Israeli territory will also prevent the possibility of a response by a third state acting under the principle of "mutual responsibility".<sup>71</sup> Vice Adm. **Yochai Bin Nun** already stated in the early 1990s that something more than torpedo tubes was needed on the submarines (torpedo shafts – 10

instead of 6 - delete), and that it would be possible to launch the Harpoon missiles (a length – delete) to a range of 100 km. from a depth of 60 m. In his view, then, despite the Dolphin's high cost of \$250 million, it is the ultimate offensive instrument of a navy that almost does not carry defensive equipment, with an extremely high survival factor and high output especially in the areas of offense and intelligence. Already at that stage he tried to wield personal influence toward replacing the Harpoon with Tomahawk cruise missiles that have a 450 kg. warhead, a speed of 850 km./hr., an accuracy of 10 m. (CEP), and a range of up to 2,500 km.<sup>72</sup>

Building the submarine deployment requires three main elements: budget, technology, and survivability. In today's navy the latter two elements exist, which demonstrates the existence of a developed and modern maintenance system and a high level of operation.

The torpedo tubes that have been added to the Dolphin have a diameter of 650 mm. instead of the common 533 mm. (similar to the Russian AKILA submarine that is capable of carrying nuclear warheads). Also *Saar 5*'s with specific-guided ammunition, or civilian vessels with similar, or nuclear, armament can also, while sailing the maritime spaces, strike strategic targets of the enemy.

The mobility of the *Saar 5s* gives them a strategic advantage, and just as the American *Aegis* system also functions as aerial monitoring units,<sup>73</sup> they can also serve as a base for launching antimissile missiles, (the Patriot and, in the future, the Arrow – delete) as well as cruise missiles.

Today the expected nuclearization of Iraq and Iran may possibly force Israel to “gradually come out of the closet”. So far Israel has not acknowledged that she has nuclear weapons and has consistently reiterated her statement that she will not be the first to introduce nuclear weapons to the region. However, in light of the increasing dangers from the east, to delay the planning of nuclear strategies is likely to have very dangerous consequences. Indeed, according to sources in the foreign press Israel has for a number of years been developing a second-strike force from submarines (sea-launched ballistic missiles, or SLBM). Furthermore, early in 2000 the director-general of the Defense Ministry, Amos Yaron, went to the United States with the aim of convincing the Pentagon to sell Tomahawk cruise missiles to Israel. Israel submitted to the United States an official request for these missiles as part of the “compensation package” that would be provided if she signed a peace treaty with Syria. Prime Minister **Ehud Barak** also raised this subject in his conversations with President Clinton. However, the Pentagon made clear – albeit delicately – that the likelihood of supplying these missiles to Israel was very low. Thus the Director-General of the Ministry

was sent to Washington but returned with empty hands.<sup>74</sup> Actually, Shimon Peres had already requested these cruise missiles from the Americans back in 1975 – to the annoyance of Prime Minister **Yitzhak Rabin**, who saw this as reflecting the whimsicality of his then-Defense Minister. Currently Peres regards the naval arm as a unit that can deliver a reliable second strike, and he believes that creating such a capability is likely to stabilize the regional strategic equation in case of Iraqi and/or Iranian nuclearization. Indeed a “new Middle East”.

Different reports in the international media, dealing with the Israeli navy and its plans for armament, focus on an important strategic armament that the IDF is undergoing in this period and that presages a different deployment against the anticipated threats in the coming decade. This pertains to the vital need already cited four years ago by the then-director-general of the Defense Ministry and former commander of the air force, **David Ivry**, who spoke of building a strategic deterrent potential that could serve as a main element in producing Israel's second-strike capability. The need to find deterrent solutions is based on the assessment that in the coming decade Iran, and possibly also Iraq, will acquire a nuclear ballistic capability to strike targets in Israel. The experience of the Cold War teaches that the only way to cope with a nuclear threat is by building a reliable deterrent capability, which will make it clear to the threatening party that even if it launches nuclear weapons, the attacked side will always retain a sufficient quantity of weapons to cause damage so grave as to cast doubt on the logic of using the nuclear weapons in the first place (i.e., the second-strike capability). This was the basis for preserving the nuclear stability between the two superpowers, and it will almost certainly be the basis on which the strategic system in the multinuclear Middle East will be formed.

Precisely in Israel's conditions, with her small territory that is likely to tempt her adversaries to use the surprise factor in an attempt to destroy all or most of her strategic weaponry, building a second-strike capability is particularly important. Israel must develop strategic weapon systems that will not be vulnerable to the enemy's strategic weapons. In addition to protection and hardening of the ballistic missiles, by building silos and possibly using aircraft equipped with strategic weapons that can cruise in the air during the crisis period, the most efficient solution is to locate strategic weapons in the sea. Making the deterrent capability reliable requires developing strategic components that cannot be hit even when the enemy mounts a successful surprise. The most efficient and reliable element is a submarine force equipped with missiles that can be launched from underwater, since it is very hard to locate them.<sup>75</sup> The knowledge that such missiles are in Israel's hands will likely deter a nuclear launching against her, given the awareness that it will be impossible to avoid a lethal counterstrike.

The navy's strategic function in the framework of the IDF's deployment against the anticipated threats, and the centrality of the submarines in forming the new concept, of course have not gone unnoticed by foreign observers. But commanders of the force, too, have expressed themselves more than once in this vein. Continuing Vice Admiral (ret.) Botser's earlier words (in an interview in December 1999), "Submarines can constitute a national means, for the state and not just for the navy. The enemy will not be tempted to carry out a 'first strike' ...because he knows he will not emerge from it unscathed."<sup>76</sup>

The Dolphin submarines constitute, then, the last apex of the triangle, which is also composed of the bomber planes and ballistic missiles, and is supposed to serve as Israel's strategic insurance policy in an era in which her adversaries possess a capability for a nuclear strike to her territory. As written above, according to Gen. (res.) **Yisrael Tal**, "The Israeli navy must make the sea part of its security depth. The role of the navy must change – no longer an assisting arm, but a strategic deterrent arm."<sup>77</sup>

Israel also seeks to play a role on the global level by utilizing the waters of the Indian Ocean, and is working to strengthen its strategic alliance with India, which centers on the nuclear armament of the two countries' naval vessels.<sup>78</sup>

## **Conclusion**

The existential threats that already confront the State of Israel at the outset of the 21<sup>st</sup> century (a threat of missiles with nonconventional warheads and a potential nuclear threat) require the helmsmen of the state to arrive at courageous decisions that will foster a revolution in the IDF's battle concept and in the role of the naval arm. The change will mean a transition to a concept similar to the one that developed among the naval powers – the United States, the Soviet Union/Russia, France, and Britain – which, despite their large territories, have relied in the past and at present on nuclear weapons located on submarines. These decisions must already be tangibly realized during the next five years, by which time nuclear weapons are expected to be operational in some of the confrontation states. The ground-to-ground missile threat, which became a reality more than ten years ago, fostered a revolution in the battle doctrine that is based on counterfire before movement and fire, on the interior's participation in the warfare before or together with the front, and that uses the maritime space like a ground space for launching missiles and includes the naval arm in fighting for victory. Thus, to develop the naval arm as a complement to the other two arms, so as to form a deterrent "triangular response force" against the conventional and nonconventional ground-to-ground missile threat, is a vital need. Fulfilling the new concept

requires changing the composition of the defense budget – which still has not been decided on by the military leadership and the Defense Ministry.

The navy must also act to ensure its control of the maritime space, in light of the changing force ratios between it and the Arab navies. This is because one of the conditions for effectively using the maritime space as strategic depth, and for realizing the second-strike capability, is to maintain naval control. Having an effective naval deployment that can answer operational needs and also strengthen Israel's deterrent capability requires increasing the number of *Saar* 5 missile boats from three to 6-8. The price of these boats stands at \$250 million. Likewise, the number of Dolphin submarines must be increased to six. The price of such a system comes to \$1.2-1.9 billion, which will have to be allocated during the coming years.<sup>79</sup>

These decisions must already be taken now, so as to begin the equipage in the years ahead of us.

---

## Endnotes

- <sup>1</sup> Yigal Allon, "Israel: The Case for Defensible Borders", **Foreign Affairs**, Vol. 55, No. 1, Oct. 1976, pp. 46-47; B. Bell, J., "Bab El Mandab, Strategic Troublespot", **Orbis**, 16, Winter 1973, pp. 975-989; Ruth Lapidot, "Passage through the Strait of Bab El Mandeb", **Israel Law Review**, 13, Apr. 1978, pp. 180-193; Gershon Orion, "The Right of Shipping in Egypt", **Ma'archot**, No. 225, Sep. 1972, pp. 53-56 (Hebrew); Mordechai Abir, "Sharm Al-Sheikh Bab El-Mardeb: The Strategic Balance and Israel's Southern Approaches", **Jerusalem Papers on Peace Problems**, No. 5, Leonard Davis Institute, the Hebrew University of Jerusalem, Mar. 1974; Gregory Copley, "The Concept of Israel as a Major Red Sea Power", **Defense and Foreign Affairs**, 8, Mar. 1977, pp. 12-14; A. S. Renyer, "The Strait of Tiran and the Sovereignty of the Sea", **Middle East Journal**, 21, summer 1967, pp. 403-408; Aaron S. Klieman, "Bab Al-Mandab: The Red Sea in Transition", **Orbis**, 11, Feb. 1967, pp. 758-771; Leo Gross, "Passage through the Strait of Tiran and the Gulf of Aqaba", **Law and Contemporary Problems**, 33, Winter 1968, pp. 124-146.
- <sup>2</sup> Ruth Lapidot, "Freedom of Navigation with Special Reference to International Waterways in the Middle East", **Jerusalem Papers on Peace Problems**, No. 13-14, Leonard Davis Institute, the Hebrew University of Jerusalem, 1975.
- <sup>3</sup> Yedidia Yaari (Rear Adm.), "The Littoral Arena: A World of Caution", **Naval War College Review**, Spring 1995, Vol. XLVIII, No. 2, pp. 7-19.
- <sup>4</sup> <[http://www.Janes.com/Janes\\_fighting\\_ships\\_2001-2002.html](http://www.Janes.com/Janes_fighting_ships_2001-2002.html)>.
- <sup>5</sup> Today, despite the designated time in which Israel requested to build the Dolphin submarines, the construction of diesel submarines is made possible in the United States by two factors: (1) the US navy does not feel a "threat" from Congress similar to that which existed 10 years ago regarding building diesel submarines in the United States, and (2) building diesel submarines for the Israeli

- 
- navy has different implications than building them for the Egyptian navy because the Israeli navy is regarded as a state-of-the-art force, and the US navy is apprehensive of this.
- <sup>6</sup> Reuters, Feb. 11, 2001; **Defense Daily**, Jan. 4, 2001, <[www.eagle.org/news/press/Jan25-2001.html](http://www.eagle.org/news/press/Jan25-2001.html)>.
- <sup>7</sup> <[www.is.northropgrumman.com/media-news/egypt\\_sixth\\_plan.pdf](http://www.is.northropgrumman.com/media-news/egypt_sixth_plan.pdf)>.
- <sup>8</sup> **The Military Balance 2000-2001**, IISS (International Institute for Strategic Studies), London, 2001, pp. 137-138.
- <sup>9</sup> Itamar Eichner, "Israel Prevents Purchase of Submarines by Egypt", **Yediot Aharonot**, Feb. 10, 2000 (Hebrew).
- <sup>10</sup> In the assessment of naval commander Vice Adm. (ret.) Alex Tal at the end of his tenure: "...today Egypt has an enormous fleet. Several times larger than what they had before the peace agreement...they have closed a great number of gaps with us...today the Egyptians fire missiles from the Chinese submarines in their possession and they have twice as many helicopters as we have." See Alex Fishman, "If Israel Wants to Hide Something, It Will Have to Be in the Sea" **Yediot Aharonot**, Dec. 31, 1999 (Hebrew).
- <sup>11</sup> **The Military Balance 2000-2001**, IISS, London, 2001, pp. 135-136, 146-147, 152-154.
- <sup>12</sup> Frigates of the *Sov Koni* kind that are equipped with Soviet SAN-4 sea-to-air missiles. Also relevant are weapons found on the F-2000 and F-4000 frigates in the Saudi fleet. Most likely weapons of this type will also be on all the missile-carrying platforms with volume of 800-900 tons and over.
- <sup>13</sup> Almog, Z., Vice Admiral, "Israeli Naval Theater", **IDF Journal**, Vol. 3, No. 2, 1989, pp. 16-27; Clyde Owan, "The Arab-Israeli Naval Imbalance", **Proceeding**, Mar. 1983, pp. 102-109.
- <sup>14</sup> Avi Oval, "Submarines to the Fore", **Bein Galim**, No. 1, Oct. 2001, pp. 48-58 (Hebrew); Commander of the Submarine Fleet, "Prepared for Any Scenario", **Bein Galim**, Oct. 1998, p. 8 (Hebrew); Arieh O. Sullivan, "Dolphin Sub Suffers Mishap", **Jerusalem Post**, Aug. 10, 2001; "Israel's First Dolphin due for Delivery", **Middle East and North Africa**, Jan./Feb. 1997, p. 19; Walter Andrews, "Navy Plans to Sink \$300 Million into Diesel Subs in Israel", **Washington Times**, May 1985, pp. 9-10.
- <sup>15</sup> Op. cit., **The Military Balance 2000-2001**, pp. 142-143.
- <sup>16</sup> See intelligence document 431/1953/2, IDF Archive (Hebrew).
- <sup>17</sup> See intelligence document (spying and disruption also under cover of UN ships): 2168/1950/37, IDF Archive (Hebrew).
- <sup>18</sup> See: General Staff meeting, Nov. 17, 1955, pp. 1-23, IDF Archive (Hebrew).
- <sup>19</sup> Anthony R. Wells, "The June 1967 Arab-Israeli War", pp. 158-167; Richard B. Remnek, "The Politics of Soviet Access to Naval Support Facilities in the Mediterranean", pp. 161, 358, 364-388, in **Soviet Naval Diplomacy**, edited by Bradford Dismukes, James M. McConnell, Pergamon Press, Oxford, 1979.
- <sup>20</sup> Ennes, James M., "Assault on the *Liberty*: The True Story of the Israeli Attack on an American Intelligence Ship", Random House, New York, 1979, pp. 61-103; Smith, Richard K., "The Violation of the 'Liberty,'" **US Naval Institute Proceedings**, 104, June 1978, pp. 62-73; Berman, Sylvan M., "A Historical Note: The 1967 Israeli Attack on the Electronic Spy Ship Revisited", **International Problems**, 18, Fall 1979, pp. 59-63.
- <sup>21</sup> Robert G. Weinland, "Egypt and Support for the Soviet Mediterranean Squadron: 1967-1976", pp. 266-269, in **Naval Power in Soviet Policy**, edited by Paul J. Murphy, published under the auspices

- of the US air force, 1978; Richard B. Remnek, "The Politics of Soviet Access to Naval Support Facilities in the Mediterranean", pp. 73, 194, 208-209, 358, 364-388, in **Soviet Naval Diplomacy**, edited by Bradford Dismukes, James M. McConnell, Pergamon Press, Oxford, 1979; Lutwak, Edward N. and Robert G. Weinland, "Sea Power in the Mediterranean: Political Utility and Military Constraints", **The Washington Papers**, Vol. 6:61, Beverly Hills and London, Sage Publications, 1979, pp. 7-24; Weinland, [again Weinland] Robert G., "Superpowers' Naval Diplomacy in the Oct. 1973 Arab-Israeli War", in **Sea Power in the Mediterranean: Political Utility and Military Constraints**, E.N. Luttwak and R.G. Weinland (eds.), **Washington Papers**, vol. 6:61, Beverly Hills and London, Sage Publications, 1979, pp. 75-87; Igor Amoso Capt. (ret.), "Russia and the Soviet Union in the Mediterranean", Naval Library, 1985, pp. 1-14; Miller F.C., "Those Storm Beaten Ships, upon Which the Arab Armies Never Looked", **US Naval Institute Proceedings 101** (Mar. 1975), pp. 18-25.
- <sup>22</sup> "The Navy in the Peace for Galilee Operation", Yad Tabenkin, the Association for Military History, Apr. 1966 (Hebrew).
- <sup>23</sup> "The Navy's Composition of Forces for the Next Five Years", Office of the Chief of Staff, 1910/172/64, May 13, 1954, IDF Archive (Hebrew); General Staff Meeting, Dec. 21, 1954, pp. 4-5, 8-10; General Staff Meeting, Jan. 14, 1954, pp. 2, 30-31, IDF Archive (Hebrew).
- <sup>24</sup> Yitzhak Shoshan, **The Last Battle of the Eilat Destroyer**, Tel Aviv, Sifriat Ma'ariv, 1984, pp. 136-144, 148, 152 (Hebrew); Shlomo Harel, **The Sea Before You**, Tel Aviv, Ministry of Defense, 1998, pp. 122-212, 250 (Hebrew); Rear Adm. (ret.) Eli Rav, "Gabriel Boats", **Ma'archot**, No. 296, Dec. 1984, pp. 31-37 (Hebrew); Vice Adm. (ret.) Harel Shlomo, "The Story of the *Saar* Boats", **Ma'archot Yam**, Nos. 99-100, Sep. 1970, pp. 14-17 (Hebrew); Rear Adm. (ret.) Eli Rahav, Israeli navy (ret.), "Missile Boat Warfare: Israeli Style", Naval Library, Mar. 1986, pp. 107-113; Statements of Brig.-Gen. Yitzhak Rabin, Dec. 8, 1962, p. 8, IDF Archive (Hebrew); Statements of Vice Adm. Yohai Bin-Nun, General Staff Meeting 1/65, Jan. 4, 1965, p. 12, IDF Archive (Hebrew); Injunctions (Gen. Yitzhak Rabin, head of the Operations Branch at GHQ) for Planning a Multiyear Composition of forces 1962-1967, July 28, 1960, in: Team for Planning the IDF Composition of forces, "Hashmonaim": IDF Composition of forces 1965 (proposal), Sep. 1961, pp. 6-7, 10-11, IDF Archive (Hebrew); Naval Command, Sea Department, "Main Points of the Naval Work Plan for 63/64", Mar. 13, 1963, IDF Archive (Hebrew).
- <sup>25</sup> Rear Adm. (ret.) Kimche, "The Transition to Missile Boats", **Ma'archot**, No. 332, 1992, pp. 26-28 (Hebrew); W. Elune, "The Israeli Navy: Thought of the Future", **Military Technology**, Feb. 1987; Tizra Leibovitz, "*Saar* 5 Missile Boat: Voyage into the Future", **IDF Journal**, Winter 1979, pp. 35-37; "Israeli Corvette Design", **Navy International**, Oct. 1980, pp. 621-622; Tony Banks, "The Israeli Navy", **Navy International**, Nov. 1986, pp. 132-136; "The Future of Israel's Naval Power", **Security Affairs**, Vol. 5, No. 2, Feb. 1987, p. 1; Israel Leshem (rear adm.), "Current Naval Program: A Status Report and a Look Ahead into the Future", **Military Technology**, Sep. 1990, pp. 79-98.
- <sup>26</sup> For the debate that already started at the beginning of the 1950s, see: Statements of Chief of Staff Dori: Government Meeting, May 6, 1949, pp. 10-11, 13 (Hebrew); Protocol of the First Government Meeting, vol. 5, State Archives, Jerusalem (Hebrew); Ben-Gurion also ignored the navy when he supported the reinforcement of the air force, see: Ben-Gurion, Government Meeting, July 12, 1949, p. 10, State Archives, Jerusalem (Hebrew); and the debate continued into the 1960s, when Ezer Weizmann, Vice-Chief of Staff at the head of the Operations Branch at GHQ and former commander of the air force, opposed the extended missile boat program (12 missile boats equipped

- 
- with Gabriel missiles), and proposed building only half the force, i.e., six missile boats, and still leaving the destroyer force in the existing composition of forces (two destroyers – Eilat and Yaffo Z), see also: Weekly Meeting with the Defense Minister, June 24, 1966, Sep. 8, 1966, Records Department, Ministry of Defense, IDF Archive (Hebrew); Yitzhak Greenberger, **Account and Power**, pp. 70, 114; see also: Statements of Gen. Yitzhak Rabin, "...until then we had never seen such a quantity of missile boats...", General Staff Meeting 37/76, Nov. 6, 1966, IDF Archive (Hebrew).
- <sup>27</sup> A debate that already began at the end of the 1950s; then it focused on the destroyers vs. the investment in submarines. See: Statements of David Ben-Gurion, Minister of Defense, General Staff Meeting 28/59, Dec. 31, 1959, pp. 6-7, IDF Archive (Hebrew).
- <sup>28</sup> Statements of Gen. Bin Nun, General Staff Meeting, Jan. 1, 1962, pp. 11-20, IDF Archive (Hebrew).
- <sup>29</sup> In Aug. 1974 the commander of the navy (Vice Adm. (ret.) Binyamin Telem) submitted to the chief of staff a document on "The Naval Warfare Concept 1974-1983". According to this document, the navy's composition of forces was by 1978 supposed to include 27 missile boats (among them three hydrofoils), and from 1983 onward, 30 missile boats (among them 18 hydrofoils). In November 1974 the chief of staff and defense minister approved a program to acquire hydrofoil boats and to train manpower to operate them; see also: "Challenge for the Naval Arm 1977-1986", (Hebrew) published in Feb. 1978 during the tenure of Gen. Barkai.
- <sup>30</sup> In terms of its maritime territory the State of Israel stands between two principal nearby enemies, Syria and Egypt, and the capability to jump from arena to arena with a rapid vessel is an advantage (particularly in force concentration) when the bases of the enemy's vessels are in range of a full day's performance.
- <sup>31</sup> Strategic regions of the sea that enable naval control.
- <sup>32</sup> Almog, Z. (Vice Adm. (ret.)), "Israel Naval Theater", **IDF Journal**, Vol. 3, No. 2, 1989, pp. 16-27.
- <sup>33</sup> The American MRPV "Compass Cope" already then showed promising performances in the area of field reconnaissance, when via "Data Link" it broadcast an updated intelligence picture to the command center. The MRPVs are difficult to discover and can act within defensive fields against enemy aircraft. Cheap, one-mission MRPVs can also serve as attack MRPVs (Hubert Feigl, "Impact of New Marine Technology", Adelphi Paper 122, Spring 1976). In this context it is worth recalling that Israel has already proved its capability to develop and manufacture superb MRPVs for missions of intelligence, command and control, and electronic warfare, MRPVs that in fact were purchased by the US navy. See also: "Shipborn UAVs Await Take-off", **Jane's Navy International**, Jan.-Feb. 1998, pp. 37-43.
- <sup>34</sup> Rapidity of force concentration in reasonable time in one arena.
- <sup>35</sup> Ariel Levite, "Israeli Naval Modernization Still Highly Uncertain", **Navy International**, Dec. 1987. See also: Emanuel Rozen, "The Navy's Lavie", **Ma'ariv**, Dec. 18, 1987 (Hebrew); Gideon Raz and Ariel Levite, "The Naval Force", **Ma'ariv**, Jan. 1988 (Hebrew); Shlomo Harel, "Yes to Submarines No to Saar 5", **Ha'aretz**, Mar. 30, 1988 (Hebrew); also within the General Staff there was a heated argument over the large investment that was supposed to come at the expense of the other arms, particularly the ground force. In the General Staff meeting in which the Saar 5 project was first presented, the then-Deputy Chief of Staff, Dan Shomron, noted that he "had not heard that the threats had changed since December 1978" – General Staff discussion 65/80, June 20, 1980 (Hebrew).

- 
- <sup>36</sup> Avi Even, interview with Rear Adm. Yedidia Yaari, deputy commander of the navy, "Prepared for Any Scenario", **Bein Galim**, Oct. 1998, pp. 6-7 (Hebrew).
- <sup>37</sup> Lieut. Gen. Chaim Laskov, General Staff meeting, 30/58, Sep. 22, 1958, IDF Archive (Hebrew); see also: Yitzhak Greenberg, **Account and Power**, pp. 65, 76, 108-111 (Hebrew).
- <sup>38</sup> Lieut. Gen. Yitzhak Rabin, Weekly Meeting with the Defense Minister, Jan. 24, 1964 (Hebrew); Ministry of Defense, Records Dept., IDF Archive: "The Navy's Main Force Is Not in Submarines but in Missile Boats..." (Hebrew); see also: Lieut. Gen. Rabin, General Staff Meeting, 22/63, Aug. 19, 1963, IDF Archive: Rabin, Make development of the submarine deployment conditional on maintaining the planned deployment of missile boats and the necessary allocation of resources for maintenance (Hebrew); and on the same issue – Operations Branch at GHQ Planning, Binyamin Yaakov file, IDF Composition of forces 1962 (proposal), p. 4, IDF Archive (Hebrew).
- In 1963 Prime Minister Eshkol asserted that the navy's composition of forces for 1968 would include four submarines – in the Summary of the Discussion of the Navy Composition of forces 1963-1968, hosted by the defense minister, Sep. 6, 1963, IDF Archive (Hebrew); because of the delays and arguments the submarines arrived late (the first submarine arrived in December 1967 instead of June 1966).
- <sup>39</sup> The submarines were planned in Germany and built in Britain. They were budgeted towards the end of the 1960s and arrived in the mid-1970s (Dec. 7-21, 1976), and continued to operate in the navy almost till the end of the 1990s (actually Germany also funded the purchase of the S submarines in the 1950s and the T in the 1960s – Yigal Avidan, **Ma'ariv** correspondent in Germany (Paris-delete), **Ma'ariv**, July 8, 2000.
- <sup>40</sup> Alex Fishman, "If Israel Wants to Hide Something, It Will Have to Be in the Sea", **Yediot Aharonot**, Dec. 31, 1999 (Hebrew).
- <sup>41</sup> Writings of Yochai Bin Nun, Kibbutz Ma'agan Michael, Jan. 2000 (Hebrew).
- <sup>42</sup> Commander of the Submarine Fleet, "Prepared for Any Scenario", **Bein Galim**, Oct. 1998, p. 8 (Hebrew); Reuven Pedatzur, "The Importance of the New Submarines", **Ha'aretz**, July 24, 1999 (Hebrew); "**Sunday Times**: Dolphin Submarines to Be Supplied to Israel Will Be Able to Carry Nuclear Warheads", **Ha'aretz**, Dec. 12, 1999 (Hebrew); Yisrael Tal, Symposium: "The Maritime Element of the National Security of the State of Israel", Sep. 1995 (Hebrew); Aluf Ben, "Words of a House Strategist", interview with Gen. Tal, **Ha'aretz**, Aug. 3, 1999 (Hebrew); Alex Fishman, "Israel Will Insist: We Need Cruise Missiles", **Yediot Aharonot**, Jan. 23, 2000 (Hebrew); Alex Fishman, "If Israel Wants to Hide Something, It Will Have to Be in the Sea", **Yediot Aharonot**, Dec. 31, 1999 (Hebrew); Arieh O'Sullivan, "Dolphin Sub Suffers Mishap", **Jerusalem Post**, Aug. 10, 2001; Avi Oval, "Submarines to the Fore", **Bein Galim**, No. 1, Oct. 2001, pp. 48-58 (Hebrew).
- <sup>43</sup> Writings of Vice Adm. Yochai Bin Nun, Kibbutz Ma'agan Michael, Jan. 2000 (Hebrew).
- <sup>44</sup> Reuven Pedatzur, "A New Battle Doctrine", **Politika**, No. 26, 1989, pp. 10-13 (Hebrew); Reuven Pedatzur, "Israel: Updating the Military Doctrine", **Ma'archot**, No. 319, June-July 1990, pp. 20-29 (Hebrew).
- <sup>45</sup> Writings of Vice Adm. Yochai Bin Nun, Kibbutz Ma'agan Michael, Jan. 2000 (Hebrew).
- <sup>46</sup> Ami Ettinger, "The (Very) Long Arm of Israel", **Ma'ariv**, May 3, 2000 (Hebrew).
- <sup>47</sup> Shlomo Min, "An Officer and a Gentleman", **Bein Galim**, No. 1, Oct. 2001, p. 37.
- <sup>48</sup> *Ibid.*, p. 37.
- <sup>49</sup> *Ibid.*, pp. 35-36.

- 
- <sup>50</sup> Vice Adm. (ret.) Alex Tal: "...we live in an era in which commercial satellites can photograph anything...the entire territory of Israel will be covered by a civilian satellite, and nothing will be able to remain hidden; on the other hand, the technology of underwater discovery has progressed very little. If we want to hide something it will be in the sea" (Alex Fishman, "If Israel Wants to Hide Something, It Will Have to Be in the Sea", **Yediot Aharonot**, Dec. 31, 1999, Hebrew). See also: Yoash Tsiddon, "No Room for Error in a Minuscule Country", pp. 115-116, in Arie Stav, ed., **Ballistic Missiles: Threat and Response**, op. cit.
- <sup>51</sup> Yisrael Tal, **National Security: The Few Against the Many**, Tel Aviv, Dvir, 1996, pp. 100, 221, 223 (Hebrew); Statements in a Symposium on: "The Maritime Element in the National Security of the State of Israel", Oct. 19, 1995 (Hebrew).
- <sup>52</sup> Reuven Pedatzur, "The Arrow System: A Few Question Marks", **Nativ**, Nos. 1-2 (54-55), Jan.-Feb. 1977, p. 153 (Hebrew).
- <sup>53</sup> Efraim Inbar and Shmuel Sandler, "Israel's Deterrent Capability: A Renewed Threat", **Ma'archot** 328, July 1992, p. 9 (Hebrew); Meir Steiglitz, "Dining with the Nuclear Demon", **Politika**, 26, 1989, p. 37 (Hebrew).
- <sup>54</sup> Dany Shoham, "The Chemical-Biological Threat to Israel", pp. 25-76; Angelo M. Codevilla, "Missiles, Security and Israel", pp. 14-57; Yoash Tsiddon, "No Room for Error in a Minuscule Country", in **Ballistic Missiles: Threat and Response**, op. cit., pp. 97-124; Gerald Steinberg and Aharon Ettingof, "The Nuclear Program of Arab and Muslim States: Strategic Capabilities and Implications", **Nativ**, No. 3 (80), June 2001, pp. 24-33 (Hebrew); Alex Fishman and Boaz Bismont, "Libya Is Trying to Threaten Israel and the NATO Countries with Missiles", **Yediot Aharonot**, Jan. 18, 2000 (Hebrew); Gabi Kesler, **Ma'ariv** correspondent in New York, "A Revolution in the CIA's Assessments: Iran May Have an Atom Bomb Force", **Ma'ariv**, Jan. 16, 2000 (Hebrew); Alex Fishman, "In Israel They Were Not Surprised", **Yediot Aharonot**, Jan. 18, 2000 (Hebrew); Ron ben Ishai, "Iran's Nuclear Weapons", **Yediot Aharonot**, Aug. 11, 2000 (Hebrew); Reuven Pedatzur, "The End of Innocence", **Ha'aretz**, Sep. 1998 (Hebrew).
- <sup>55</sup> Yuval Ne'eman, "Israel and the Limitations of Nuclear Deterrence", **Nativ**, Nos. 1-2 (54-55), Jan.-Apr. 1992, p. 170 (Hebrew); Brig. Gen. (res.) Aharon Levrant, "Active Defense: A Necessary Updating of the Security Concept", **Nativ**, No. 3 (32), May 1993, pp. 23-30 (Hebrew).
- <sup>56</sup> There are more than 1,500 missiles threatening Israel from Syria, Iraq, Egypt, Iran, Saudi Arabia, and Libya, each country possessing dozens to hundreds of missiles some of which have nonconventional warheads. In a number of years they will reach ranges of 5,000 km. and will be able to threaten Europe and even the United States.
- <sup>57</sup> The *Nadong 2* from North Korea or the *Shihab-3* or *-4* from Iran. See: Amir Rapaport and Arie Egozy, "Israel in the Range of Iran's Missiles", **Yediot Aharonot**, July 16, 2000 (Hebrew); Azriel Lorber, "The Missile Threat against Israel", **Ballistic Missiles: Threat and Response**, op. cit., pp. 3-13; Alex Fishman, "Real Cause for Worry", **Yediot Aharonot**, July 16, 2000 (Hebrew).
- <sup>58</sup> A "reliable second strike" refers to maintaining a stable balance of deterrence by ensuring the survivability of the nuclear launching systems by, in turn, protecting them against enemy attack so that the possibility of responding with a nuclear counterattack will be preserved. Or, in other words, zero chance of neutralizing all the components of the "retaliation system".
- <sup>59</sup> Reuven Pedatzur, "A Strategic Insurance Policy", **Ha'aretz**, June 27, 2000 (Hebrew); Sharon Sadeh, Israeli emissary to Britain, "Dolphin Submarines to Be Supplied to Israel Will Be Able to Carry Nuclear Warheads", **Ha'aretz**, Dec. 12, 1999 (Hebrew); Reuven Pedatzur, "A Strategic

- 
- Navy”, **Ha’aretz**, Nov. 5, 2000 (Hebrew); Reuven Pedatzur, “The Importance of the New Submarines”, **Ha’aretz**, July 24, 1999 (Hebrew).
- <sup>60</sup> Charles A. Meconis, “The Naval Dimension of Global Security after the Cold War: A US-Russian Perspective”, pp. 1-10; Boris N. Makeev, “Naval Aspects of Russia’s National Security”, pp. 30-34, in: Charles A. Meconis and Boris N. Makeev, **US-Russian Naval Cooperation**, Praeger, 1996.
- <sup>61</sup> Shmuel Tzavag, “Monthly Survey”, **Nuclear Strategy**, 36 (9), p. 13.
- <sup>62</sup> Peter Nailor and Jonathan Alford, “The Future of Britain’s Deterrent Force”, Adelphi Papers No. 156, pp. 4-8.
- <sup>63</sup> Reuven Pedatzur, “A Relevant Indian Document”, **Ha’aretz**, Dec. 29, 1999 (Hebrew).
- <sup>64</sup> Aluf Ben, “Words of a House Strategist”, interview with Gen. Tal, **Ha’aretz**, Aug. 3, 1999 (Hebrew); see also Yisrael Tal, **National Security: The Few against the Many**, Tel Aviv, Dvir, 1996, p. 223 (Hebrew).
- <sup>65</sup> “The Maritime Range: The Strategic Depth of the State of Israel under the Survivability Principle”, **Ma’archot**, Ministry of Defense, July 1998, pp. 25-30 (Hebrew).
- <sup>66</sup> Authors' interview with him (for writing of doctorate-delete), Jan. 1999.
- <sup>67</sup> Reuven Pedatzur, “A Strategic Insurance Policy”, **Ha’aretz**, June 27, 2000 (Hebrew); Zeev Gail, “Israel Made an Experimental Launching of a Cruise Missile from a Submarine”, **Ma’ariv**, June 18, 2000 (Hebrew); Sharon Sadeh, Israeli emissary to Britain, “Dolphin Submarines to Be Supplied to Israel Will Be Able to Carry Nuclear Warheads”, **Ha’aretz**, Dec. 12, 1999 (Hebrew).
- <sup>68</sup> Alex Fishman, “If Israel Wants to Hide Something, It Will Have to Be in the Sea” **Yediot Aharonot**, Dec. 31, 1999 (Hebrew).
- <sup>69</sup> Authors' interview with him (for writing of doctorate-delete), Mar. 2000.
- <sup>70</sup> “Israel: The Danger of Thinking with a Nuclear Warhead”, speech by Issam Makhoul, Member of Knesset, Israel, Uppsala, Sep. 1-4, 2000; Shai Feldman, **Nuclear Deterrence for Israel**, Tel Aviv, Hakibbutz Hameuhad, 1988, pp. 101-102 (Hebrew).
- <sup>71</sup> Col. (ret.) Yoash Tsiddon, “No Room for Error in a Minuscule Country”, **Ballistic Missiles: Threat and Response**, op. cit..
- <sup>72</sup> Writings of Vice Adm. Yochai Bin Nun, Kibbutz Ma’agan Michael, Jan. 2000 (Hebrew).
- <sup>73</sup> Frank Gaffney, “The *Aegis* Option: How to Provide Both Israel and the United States with Effective Defense Against Ballistic Missiles in the Short Term”, in Arie Stav, ed., **Ballistic Missiles: Threat and Response**, op. cit., pp. 219-226.
- <sup>74</sup> Alex Fishman, “Israel Will Insist: We Need Cruise Missiles”, **Yediot Aharonot**, Jan. 23, 2000 (Hebrew).
- <sup>75</sup> The limitation that the submarine is revealed after the first firing requires it to act in cooperation with a surface force, but it has no problem regarding coastal protection and missile fire. Likewise, the constant communication between command and control from the coast and the submarines has improved immeasurably, and today there are technical capabilities that did not exist in the past, and that also are available to small states such as Israel.
- <sup>76</sup> A capability for launching missiles from submarines was developed in the navy as far back as May 1982. About a month before the Lebanon War the development of an operational system was completed, and it was installed in Gal submarines for launching Harpoon missiles. But the Harpoon’s range is only about 120 km, whereas significant deterrence requires a much longer

---

range, like that of long-range cruise missiles that, according to foreign sources, have been developed by Israel.

- <sup>77</sup> Aluf Ben, interview with Gen. (ret.) Yisrael Tal, **Ha'aretz**, Nov. 26, 1996, p. B2 (English) Yisrael Tal, **National Security: The Few against the Many**, Tel Aviv, Dvir, 1996, pp. 222-223 (Hebrew).
- <sup>78</sup> M. Sherman and M.L. Sondhi, "Indo-Israeli Strategic Cooperation as a US Interest", Ariel Center for Policy Research, 1999; Daphna Vardi, London, "Israeli Submarines in the Waters of the Persian Gulf", **Ma'ariv**, Dec. 8, 2000 (Hebrew).
- <sup>79</sup> A proposal that was raised during the tenure of Vice Adm. (ret.) Zeev Almog (1979-1985) and during that of Moshe Levy as chief of staff (1983-1987).