Operating in Contested Littorals: Israel, 1967 to 1973

A Monograph

by

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In 2019, the US Marine Corps published planning guidance that identified contested littorals as a future focal point for the service and the development of concepts and integration with the joint force. The shift away from large-scale joint forcible entry with sustained operations inland and towards flexible force employment in contested littorals requires a reexamination of history for examples of maritime operations in similar operating environments. The experiences of Israel between 1967 and 1973, including the War of Attrition and the 1973 War, offer insight into successful and sustained operations within maritime A2AD environments. The War of Attrition case study provides context to operating within contested littorals during limited or low-intensity conflict. The case of the 1973 War allows an examination of maritime operations in contested environments during large-scale conflict. Both case studies supply the modern US Marine Corps with a valuable historical perspective for the successful penetration of A2AD systems in the pursuit of establishing operational access.

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Abstract

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In 2019, the US Marine Corps published planning guidance that identified contested littorals as a future focal point for the service and the development of concepts and integration with the joint force. The shift away from large-scale joint forcible entry with sustained operations inland and towards flexible force employment in contested littorals requires a reexamination of history for examples of maritime operations in similar operating environments. The experiences of Israel between 1967 and 1973, including the War of Attrition and the 1973 War, offer insight into successful and sustained operations within maritime A2AD environments. The War of Attrition case study provides context to operating within contested littorals during limited or low-intensity conflict. The case of the 1973 War allows an examination of maritime operations in contested environments during large-scale conflict. Both case studies supply the modern US Marine Corps with a valuable historical perspective for the successful penetration of A2AD systems in the pursuit of establishing operational access.

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Glossary of Terms

A2AD	Anti-access, area denial
EABO	Expeditionary Advanced Base Operations
ECM	Electronic countermeasure
EMS	Electromagnetic spectrum
ESM	Electronic support measure
Gabriel	Israeli guided anti-ship missile
IAF	Israeli Air Force
IDF	Israeli Defense Force
INS	Israeli Naval Service
JOAC	Joint Operational Access Concept
Komar	Soviet class of missile boat, 70 tons
LOCE	Littoral Operations in Contested Environments
Osa	Soviet class of missile boat, 240 tons
Reshef	Israeli class of missile boat, 450 tons
Saar	Israeli class of missile boat, 250 tons
SAM	Surface to air missile
Sayeret Matkal	Principle direct-action special operations unit in Israel
Scud	Tactical ballistic surface to surface missile developed by the Soviet Union
Shayetet 13	Israeli naval commando force
Styx	Soviet anti-ship missile

Introduction

Background and Problem

In July 2019, General David Berger, Commandant of the US Marine Corps, published his planning guidance, identifying contested maritime spaces and support to naval operations as capstone operating concepts. In his guidance, he indicated that looking to the future, the prevalence of contested spaces within the littorals requires a corresponding ability within the US Marine Corps to penetrate anti-access, area-denial (A2AD) systems.[1] His guidance initiated a series of high-profile changes within the US Marine Corps, including the divestment of all tank formations and the creation of a Marine Littoral Regiment.

This dramatic shift in force design looks to align the future capabilities of the service with the increased emphasis of the National Security Strategy and the National Defense Strategy on operating within A2AD zones of the Indo-Pacific region.[2] Operating within A2AD environments, limiting operations to littoral regions, and directly supporting naval objectives from the land requires a change in paradigms, away from large-scale joint forcible entry and sustained operations inland, and towards flexible force employment in contested littorals against peer adversaries. Despite the service-level recognition of a new paradigm, successfully operating within A2AD littorals remains a problem for operational level commanders. Given the shift, the US Navy and Marine Corps may benefit from incorporating lessons based on the past experiences of militaries operating in similar conditions.

An examination of Israel's maritime efforts between 1967 and 1973 offers operational level insight for the US Marine Corps due to several historical parallels. Regionally, proxy

[1] David H. Berger, "Commandant's Planning Guidance: 38th Commandant of the Marine Corps" (Washington, DC, July 2019).

[2] White House, "National Security Strategy" (Washington, DC, 2017); US Department of Defense, "Summary of the 2018 National Defense Strategy of the United States of America" (Washington, DC, 2018).

competition between the Soviet Union and the United States forced the Israeli Naval Service (INS), in conjunction with the broader Israeli Defense Force (IDF), to operate within an adversary A2AD system. In the Indo-Pacific region, the US Marine Corps faces a similar proliferation of A2AD assets and a related requirement to penetrate the contested space at the operational level. For Israel, the destruction of the *Eilat*, a Second World War destroyer purchased from the British and the INS flagship, punctuated the relative weakness and unpreparedness of the naval service in relation to other regional powers. Similarly, the US Marine Corps is equally unprepared for operations in contested littorals, with a service designed for large-scale land operations supported by a predominantly blue-water navy. For Israel, the balance of power shifted with the employment of a naval force designed around a modern missile boat equipped with revolutionary electronic warfare technology. A similar shift began within the US Marine Corps when the Commandant initiated the reorganization of the force and challenged the service to develop an operational level linkage to the new strategic direction. Given the prevalence of A2AD in the Indo-Pacific and an operational necessity to conduct littoral operations in capstone concepts, the US Marine Corps can leverage the Israeli experience from 1967 to 1973 as it contemplates its future.

Significance

Much like the INS in 1970, the US Marine Corps is pursuing future maritime concepts with a service more suitable for sustained operations inland. The employment of multi-domain capabilities within the Israeli military directly contributed to the successful penetration and exploitation of a peer A2AD system. A similar operational approach can provide US Navy and Marine Corps planners with valuable insight into the requirements of successful littoral operations within A2AD environments. Between 1967 and 1970, Israel fought a low-intensity conflict with Egypt that challenged existing offensive paradigms and introduced a more sophisticated and integrated A2AD environment. During the 1973 War, Israel faced peer

adversaries in large-scale conflict with asymmetric technologies on land that threatened the dominant role of aviation and armor. At sea, Egypt and Syria, armed with the latest Soviet missile systems, threatened Israeli access to the maritime domain. To overcome and operate within the contested maritime space, Israel developed an approach that integrated land, maritime, and air domains through a campaign of raids that supported operations throughout the electromagnetic spectrum. The close coordination of naval forces, including littoral patrol ships, naval commandos, amphibious landing ships, and aircraft, all supported the overall Israeli objectives of assuring maritime access, sea control, and creating windows of opportunity for future operations. Within the Indo-Pacific region, the US Marine Corps requires a similar operational capability to penetrate contested littorals successfully. As the United States, in general, and the US Marine Corps specifically, looks towards operating within the Pacific littorals, the past offers insight into planning multi-domain operations within the increasingly contested maritime domain. The destruction of their largest capital ship in 1967 provided the INS and IDF with the impetus to make the necessary changes required to operate within A2AD environments. By learning from history, the US Marine Corps can avoid the cost of such an expensive lesson.

Definitions

Littorals and A2AD environments are interconnected concepts. Joint Publication 3-32 defines littoral regions as part of the operational environment consisting of seaward and landward segments. The seaward segment of the littoral region includes "the area from the shore to the open ocean, which must be controlled to support operations ashore"; the landward segment includes "the area inland from the shore that can be supported and defended directly from the sea."[3] In addition to the seaward and landward segments, the joint US Marine Corps and Navy concept *Littoral Operations in a Contested Environment* identified airspace, cyberspace, and the

[3] US Department of Defense, Joint Staff, Joint Publication (JP) 3-32, *Command and Control for Joint Maritime Operations* (Washington, DC: Government Publishing Office, 2013), I-6.

electromagnetic spectrum (EMS) as the “five dimensions” of littorals.[4] Based on modern maritime power projection capabilities, littoral regions encompass approximately 95 percent of the global population and 60 percent of the most significant urban areas.[5] Dr. Milan Vego, professor of joint military operations at the US Naval War College, expands on this definition by addressing the complexity added by "enclosed" and "semi-enclosed" seas. Landmasses surround enclosed seas, such as the Baltic and Mediterranean Seas, except for a strait or narrow. Semi-enclosed seas, such as the Red Sea and the North Sea, are typically adjacent to a continent and connected to an ocean by straits or narrows.[6] Enclosed and semi-enclosed seas limit the effectiveness of larger naval vessels, degrade electronic sensors due to increased clutter, and allow for more integration of land-based defensive and offensive systems into the A2AD environment.[7]

According to the Joint Operational Access Concept (JOAC), anti-access "refers to those capabilities, usually long-range, designed to prevent an opposing force from entering an operational area."[8] Area-denial typically includes shorter-range capabilities that limit freedom of action within the operational area.[9] Littoral regions add further complexity to A2AD environments and could increase the effectiveness and integration of smaller naval vessels and fast attack craft, land-based artillery, missiles, aircraft, submarines, mines, and a wide array of integrated ground and space-based radar and other detection systems.[10] Anti-access and area-denial systems create a multi-domain problem for the joint force requiring cross-domain synergy

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[4] US Marine Corps, *Littoral Operations in a Contested Environment: Unclassified Edition* (Washington, DC: Government Publishing Office, 2017), 9.

[5] Milan Vego, “On Littoral Warfare,” *Naval War College Review* 68, no. 2 (2015): 2.

[6] Ibid., 4.

[7] Ibid, 34–42.

[8] US Department of Defense, Joint Staff, *The Joint Operational Access Concept (JOAC)* (Washington, DC: Government Printing Office, 2012), 6.

[9] Ibid., 6.

[10] Vego, “On Littoral Warfare,” 3.

to achieve operational access. The JOAC defines operational access as "the ability to project military force into an operational area with sufficient freedom of action to accomplish the mission."[11] In the future operating environment, the projection of force into a littoral A2AD environment will require foresight and the development of a multi-domain operational approach that includes cross-domain synergy from the joint force.

Hypothesis

The Israeli experience from 1967 to 1973 provides the US military with an example of a multi-domain maritime force penetrating a peer adversary A2AD system to achieve operational access in both low and high-intensity conflict. The case studies show that penetration of an A2AD system is possible through a coordinated raid campaign, where maneuver forces target specific portions of the system to destroy, degrade or remove equipment for intelligence exploitation, with the overall aim to create windows of opportunity for later operations. In this context, maneuver forces, such as the US Marine Corps, conduct operations supporting the exploitation of the electromagnetic spectrum rather than manipulating the EMS to support the maneuver force. In the low-intensity War of Attrition, Israel conducted a series of small-scale raids to create gaps in the A2AD network and gather intelligence on Egyptian and Soviet radar technology. Each raid created a limited window of opportunity for the subsequent raid or penetration of the system. Israel used a similar operational approach on a larger scale during the 1973 War. Israel's ability to protect the force within the electromagnetic environment while penetrating adversary A2AD envelopes contributed directly to the accomplishment of larger operational and strategic objectives.

Research Methodology

Through a comparative case study framework, the selected cases will examine relevant events between the War of Attrition and the 1973 War, with the intent to discover and explore

[11] US Joint Staff, *The Joint Operational Access Concept (JOAC)*, 1.

Israeli military actions that enabled the penetration of the A2AD environment. Both Egypt and Israel refer to the low-intensity conflict that occurred between 1967 and 1970 as the War of Attrition, and the use of the more generic 1973 War avoids any disagreement between sources and belligerents on the name of the war fought primarily between Israel, Egypt, and Syria in October 1973. The War of Attrition provides an example of low-intensity littoral operations against a peer adversary within an A2AD system. For comparison, the actions between Egypt and Israel during the 1973 War provide an example of littoral operations against an A2AD system within a high-intensity conflict. In both cases, the research will examine the underlying strategic objectives and operational approach of Egypt, the elements of the A2AD system, and the actions taken by Israel to penetrate or exploit the system.

The research initially will explore the challenges associated with the future operating environment. The sources will consist of current service concepts, including the Joint Operating Environment 2035, Littoral Operations in Contested Environments (LOCE), Expeditionary Advanced Base Operations (EABO), and The Operational Environment, 2035-2050. This research phase will also include scholarly work focused on the challenges of littoral warfare and A2AD, including Milan Vego's *On Littoral Warfare*. This examination will form the background for the consideration of the Israeli cases. With an understanding of A2AD environments and the challenges of modern littoral operations, further research will examine two cases in which the Israeli military operated within or against an A2AD environment. Secondary sources such as Chaim Herzog's *The Arab Israeli Wars* and *The War of Atonement* and Abraham Rabinovich's *The Yom Kippur War* provide an understanding of the context and general features of the conflicts. This project will combine those more general sources with detailed secondary sources and, where available, primary sources to analyze and identify operational aspects that contributed to Israeli success. Finally, the monograph will compare the historical case to the contemporary environment to draw conclusions.

Case Studies

War of Attrition: 1967-1970

The War of Attrition, fought primarily between Egypt and Israel from 1967 and 1970, represents a limited, low-intensity war within a littoral A2AD environment. Neither Israel nor Egypt wanted to escalate the conflict to high intensity, large-scale combat or explicitly violate the cease-fire from the 1967 War.[12] Egypt wanted a limited war of attrition to achieve a political decision that could break the stalemate of international acceptance of the Israeli occupation of the Sinai.[13] Influenced by the Soviet perspective, a sustained and limited conflict between Egypt and Israel would remind the UN and the rest of the world of the ongoing conflict and highlight the impact of the continued shutdown of the Suez Canal.[14] Egypt planned to use Soviet SAM-2 missile systems along the canal to protect their extensive artillery positions from Israeli air forces. Prolonged casualties from the indirect fire along the Suez Canal would keep pressure on the Israelis domestically and buy time for Egypt to rearm the military and seek an alliance for a future war.[15]

Recognizing the strategic benefit of a limited war, Egypt developed an operational approach that exploited Israel's limited ability to mobilize forces over a long period.[16] Their approach centered on using artillery barrages and cross-canal raids to inflict mounting casualties on Israel, with Egyptian forces protected from counterattack by an A2AD system built around integrated SAM-2 and ground radar stations. This provided Egypt with an A2AD zone that, if it

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[12] Yaacov Bar-Siman-Tov, *The Israeli-Egyptian War of Attrition, 1969-1970: A Case-Study of Limited Local War* (New York: Columbia University Press, 1980), 65.

[13] Daniel Asher, *The Egyptian Strategy for the Yom Kippur War: An Analysis* (Jefferson, NC: McFarland, 2009), 22.

[14] Chaim Herzog, *The Arab-Israeli Wars: War and Peace in the Middle East* (New York: Vintage Books, 1984), 196.

[15] Ibid., 199; Asher, *The Egyptian Strategy for the Yom Kippur War*, 22–23.

[16] Bar-Siman-Tov, *The Israeli-Egyptian War of Attrition, 1969-1970*, 54; Asher, *The Egyptian Strategy for the Yom Kippur War*, 27.

remained intact, prevented the Israeli Air Force (IAF) from targeting and neutralizing the armor and artillery assets along the canal. Within this framework, Egypt pursued its operational objectives during the War of Attrition in three stages: holding and defensive rehabilitation, active defense, and a final attrition and liberation stage.

During the holding and rehabilitation stage from June 1967 to August 1968, Egypt reorganized its military, creating a new centralized headquarters and air defense command. Egypt also worked with the Soviet Union to replace 70 percent of their 1967 losses with modern equipment, including the upgraded SAM-2 systems with fire-controlled radar that created the initial 16-mile wide missile zone along the canal.[17] In the active defense stage, from September 1968 to February 1969, Egypt focused on the slow attrition of Israeli forces through continued artillery strikes and raids, firing tens of thousands of artillery rounds and inflicting almost 100 casualties on the Israeli Defense Force (IDF).[18] In the final stage of attrition and liberation from March 1969 to the cease-fire in August 1970, Egypt continued to increase the volume of artillery fire and the scale of raiding efforts. Consistent throughout the War of Attrition, Egypt looked to maximize Israeli casualties along the Suez Canal, minimize the risk of escalation to a general war, and protect the force within an A2AD system anchored along the canal.

The Egyptian operational approach during the War of Attrition depended on the development and employment of a sophisticated, integrated A2AD system designed to protect critical infrastructure and military forces near the Suez Canal. Egyptian air defense in 1969 centered primarily on the Suez Canal, with small pockets of protection around Cairo, the Aswan Dam, Alexandria, and the Delta region. This included coverage from radar-controlled guns ranging from 37mm to 100mm, effective up to 10 kilometers, and SAM-2 systems effective out

[17] Mario De Arcangelis, *Electronic Warfare: From the Battle of Tsushima to the Falklands and Lebanon Conflicts* (Poole, Dorset: Blandford Press, 1985) 179; Edgar O'Ballance, *The Electronic War in the Middle East, 1968-70* (Hamden, CT: Archon Books, 1974), 19.

[18] Asher, *The Egyptian Strategy for the Yom Kippur War*, 27; Herzog, *The Arab-Israeli Wars*, 199–200.

to 60 kilometers. The integration of anti-aircraft guns and missile systems compensated for the vulnerability of the SAM-2 system to fast, low flying aircraft. By mid-1969, Egypt owned around 200 missile systems, some under Soviet control.[19]

In addition to modern Soviet radar and air defense technology, Egypt also received ten *Osa* and eight *Komar* class missile boats from the USSR. The *Osa* carried four Styx anti-ship missiles while the *Komar*, a smaller ship, carried two missiles. The Styx missile represented an advancement in naval warfare; with a range of 45 kilometers, Styx missiles gave the Egyptian navy the ability to target and destroy much larger ships beyond the range of existing naval gun technology and line of sight. Egypt demonstrated the Styx missile's capability in 1967 with the destruction of the Israeli destroyer *Eilat* and the subsequent destruction of a small Israeli fishing boat.[20] The integration of air defense, artillery, radar, and maritime anti-ship missiles created a complex A2AD system within Egypt. It also contributed to the creation of a counter-attrition operational approach in Israel that accomplished strategic goals while also minimizing the risk of escalation to a large-scale war.

Israeli strategic considerations during the War of Attrition centered on consolidating gains from the 1967 war. This placed Israel firmly on the strategic defensive in the Sinai and along the Suez Canal. More importantly, Israel did not want any conflict with Egypt to escalate into a general war, which would place a significant economic burden on the country.[21] Unable to match the combat power of most Arab nations, Israel relied on a system of reserve mobilization to counter the quantitative advantage of any threat. Dependence on a mobilized reserve force

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[19] O'Ballance, *The Electronic War in the Middle East, 1968-70,* 76-77.

[20] Abraham Rabinovich, *The Boats of Cherbourg* (New York: Seaver Books, 1988), 11, 39; "The Middle East and the Mediterranean," *The Military Balance* 69, no. 1 (January 1969): 37, accessed 20 March, 2021, https://doi.org/10.1080/04597226908459785.

[21] Bar-Siman-Tov, *The Israeli-Egyptian War of Attrition, 1969-1970,* 59-60.

required warning of an impending attack, and once mobilized, Israel needed a quick, decisive victory. A prolonged war with mobilized reserves threatened to collapse the Israeli economy.[22]

The proximity of Israeli and Egyptian forces along the Suez Canal, coupled with the Egyptian overmatch in artillery and air defense systems in the same area, prompted Israel to develop the Bar-Lev Line of fortifications to provide protection and early warning at potential crossing sites.[23] Israel also lacked international support if the conflict along the canal broadened into a general war. Diplomatic initiatives following the 1967 War, especially those involving France and the Soviet Union, included calls for complete Israeli withdrawal from occupied territories. Any hint of large-scale war with Egypt only served to undermine Israeli efforts to consolidate gains from 1967.[24]

The limitation in the scale of conflict with Egypt created several dilemmas for Israel in the development of an operational approach. In the broadest sense, Israel required an approach that created opportunities to penetrate the Egyptian A2AD system while minimizing the risk to the force and the risk of escalating the conflict. Penetration of the A2AD system required an indirect approach from Israel, where smaller maneuver units covertly penetrated the Egyptian A2AD zone to destroy specific nodes or collect intelligence for future exploitation. Through air assault and maritime raids, Israel created windows of opportunity for IAF raids into Egypt, all while keeping the larger conflict limited in nature. Israel lacked a significant naval capability between 1967 and 1970, but they did possess a competent naval commando force called Shayetet 13. Crossing the Suez Canal in force with the IDF was not an option based on political and strategic objectives, but small-scale commando raids provided several advantages for Israel.

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[22] Ehud Eilam, *Israel's Way of War: A Strategic and Operational Analysis, 1948-2014* (Jefferson, NC: McFarland, 2016), 169.

[23] Chaim Herzog, *The War of Atonement: The Inside Story of the Yom Kippur War* (London: Greenhill Books, 2003), 5-6.

[24] Bar-Siman-Tov, *The Israeli-Egyptian War of Attrition, 1969-1970,* 79.

Through a campaign designed around raids to destroy portions of the network or collect intelligence, Israel created windows of opportunity for later operations. Each raid improved the overall ability of the military to penetrate the A2AD system and set conditions for further raiding. Using the windows of opportunity created by the integrated raid campaign, the IAF continued targeting artillery and SAM positions along the canal and provided general support to operations outside the canal zone.[25]

Israel executed dozens of raids during the War of Attrition, with Shayetet 13 conducting over 80 actions in the Red Sea theater between 1967 and 1970. These raids served to degrade the larger A2AD system, creating windows of opportunity for other operations, often resulting in the acquisition of specific signals intelligence to ease further penetration of the system. Through this lens, the Israeli raids on Ras Adabiyah and Green Island created the A2AD gap necessary to launch Operation Boxer by the IAF and Operation Raviv by the IDF. During Operation Boxer, the IAF launched hundreds of strikes into Egypt, primarily targeting the SAM-2 network that supported the Egyptian A2AD zone covering the Suez Canal.[26] Operation Raviv included an amphibious raid across the Gulf of Suez to eliminate radar stations and coastal defense outposts. During most raids, Israel sought to capture Egyptian radar technology to improve exploitation efforts during later operations.

The Israeli raid campaign to degrade the Egyptian A2AD network and create windows of opportunity for later operations began with the Ras Adabiyah and Green Island raids in June and July 1969. Located six miles south of Port Suez in the southwestern Gulf of Suez, the Egyptians used Ras Adabiyah as a radar station and early warning outpost.[27] On 21 June 1969, Israel tasked

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[25] Bar-Siman-Tov, *The Israeli-Egyptian War of Attrition, 1969-1970*, 106.

[26] Ibid., 100–101, 135; Rabinovich, *The Boats of Cherbourg*, 190.

[27] "Israeli Commandos Raid Egyptian Naval Radar Station, Kill 15, Destroy Equipment," *Jewish Telegraphic Agency*, June 23, 1969, accessed 20 March, 2021, https://www.jta.org/1969/06/23/archive/israeli-commandos-raid-egyptian-naval-radar-station-kill-15-destroy-equipment.

Shayetet 13 with Operation Bulmus 5, the covert infiltration and destruction of the Ras Adabiyah radar station. After swimming to the outpost from a drop off point in the Gulf, the naval commandos successfully destroyed the radar and a large portion of the station. The raid degraded the Egyptian navy's ability to detect and deter the more extensive Green Island raid planned for the next month.[28]

In Operation Bulmus 6, the Green Island raid conducted on 19 July 1969, Israel focused on further degrading the A2AD network in the Gulf of Suez to create a window of opportunity for a planned amphibious raid and air campaign. The British initially constructed Green Island during World War II as an early warning and defensive outpost at the southern entrance to the Suez Canal. The Egyptians garrisoned 100 soldiers on the island to protect the radar and electronic collections equipment that supported the more extensive A2AD system located on the mainland.[29]

The Green Island raid required intense training and adaptation to ensure the covert insertion of Shayetet 13 and Sayeret Matkal, the primary special operations unit of the IDF. The raid required the combined force to use stealth to penetrate the island's defenses and minimize the threat from artillery and mainland-based aircraft.[30] The raid force used a combination of swimming, rubber craft, and small submersibles to assault the island, successfully destroying the radar station and other defensive emplacements and killing approximately 50 to 70 Egyptians. Israel also captured portions of the radar systems on the island for later exploitation.[31] The Green Island raid created a gap in the Egyptian A2AD system and a window of opportunity for Operation Boxer, the renewal of IAF strikes along the Suez Canal and deeper into Egypt. The

[28] Ze'ev Almog, *Flotilla 13: Israeli Naval Commandos in the Red Sea, 1967-1973* (Annapolis, MD: Naval Institute Press, 2010), 21-24.

[29] Ibid., 24-25.

[30] Ibid., 41-42.

[31] Ibid., 87–88; De Arcangelis, *Electronic Warfare*, 182.

Boxer strikes concluded in August 1969 and resulted in the destruction of six SAM-2 batteries and five radar installations.[32] As part of a larger campaign, the Ras Adabiyah and Green Island raids helped create the window of opportunity for Operation Escort 2 and Operation Raviv, an armored amphibious raid across the Gulf of Suez.

The increasing Egyptian artillery attacks during the third stage of the War of Attrition led Israel to continue the raid campaign in the Gulf of Suez, which shifted focus to setting conditions for an amphibious operation to destroy a large portion of the coastal defense and radar network. Following the Green Island raid in July 1969, Egypt moved two P-183 torpedo patrol boats to the Gulf to prevent Israeli efforts to conduct further maritime operations.

Operation Raviv required Israeli sea control, and the Egyptian patrol boats neutralized the planned amphibious raid. The A2AD threat limited the effectiveness of the IAF in targeting or destroying the P-183s; the IAF would be forced to locate and destroy the patrol boats at night, most likely over the course of several days. This repeated exposure could tip off the Egyptians to the planned amphibious raid, undermining the greater mission to destroy coastal radar stations and set conditions for IAF strikes against Egyptian infrastructure.[33] In a raid on 7 September 1969, Shayetet 13 used small patrol boats to tow electric submarines into position for an attack on the P-183s. Swimming from the submersibles, naval commandos covertly emplaced limpet mines on both Egyptian ships, destroying them and setting conditions for Operation Raviv. As a raid, Operation Escort 2 eliminated the naval threat to the amphibious operation, creating a window of opportunity for exploitation.[34]

With a window of opportunity established, Israel launched Operation Raviv on 9 September 1969. In support of planned IAF strikes against critical infrastructure in Egypt, the

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[32] Eliezer Cohen, *Israel's Best Defense: The First Full Story of the Israeli Air Force* (New York: Orion Books, 1993), 282.

[33] Almog, *Flotilla 13,* 100-101.

[34] Ibid., 109, 125.

IDF and Shayetet 13 planned to destroy coastal radar stations along the Gulf of Suez. In anticipation of the amphibious raid, Shayetet 13 conducted a survey of the designated landing site near El Khafayer, 25 miles south of Port Suez and 12 miles south of Ras Sadat, the anchorage for the Egyptian patrol boats destroyed during Escort 2. The reconnaissance element determined that the beach would support the landing of the raid force, and the landing craft inserted six tanks, three armored personnel carriers, and 150 soldiers.[35] The Israelis used captured Egyptian equipment from the 1967 War, including T-55 tanks, to confuse any Egyptian response to the raid. The IAF also supported the raid with 30 aircraft that provided almost continuous support to the ground force.[36]

Operation Raviv lasted for 10 hours, with the armored raid force traveling along the Egyptian coast, destroying radar stations and capturing equipment between the landing beach and Ras Za'farana. The raid force also captured a new Soviet T-62 recently provided to the Egyptians.[37] The raid demonstrated the weakness and vulnerability of the Egyptian defenses. The Egyptians concentrated the preponderance of the A2AD system in small areas, leaving significant gaps in coverage or limiting the depth and redundancy of the larger system. Operation Raviv tied into the larger Israeli effort by creating a gap in the A2AD system along the Egyptian coast. Israel used this gap to launch a series of airstrikes that targeted the SAM-2 and radar systems along the Suez Canal and to conduct airstrikes against the infrastructure deeper in Egypt. The gap in the A2AD system also contributed to the targeted raid to steal a new radar system recently supplied by the Soviet Union to Egypt.[38]

The exploitation of intelligence played a role in numerous actions conducted in the Israeli raid campaign during the War of Attrition. However, the raid at Ras Ghareb specifically targeted

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[35] Almog, *Flotilla 13*, 102.

[36] Cohen, *Israel's Best Defense*, 284.

[37] O'Ballance, *The Electronic War in the Middle East, 1968-70*, 88-89.

[38] Cohen, *Israel's Best Defense*, 288-289.

a new radar provided to Egypt by the Soviet Union. In December 1969, Israeli intelligence reported an increase in the effectiveness of Egyptian radar detection and subsequent SAM employment.[39] On 27 December 1969, Israeli conducted an air assault, landing at Ras Ghareb and destroying the radar outpost. Using Ch-53 heavy-lift helicopters, the raid force captured the 7-ton radar, a new P-12 *Spoon Rest* system that increased the effectiveness of the SAM-2 batteries in the region.

The captured radar, coupled with the destruction caused during Operation Raviv, further embarrassed President Nasser and undermined any pan-Arab solidarity.[40] By January 1970, through gaps created by the raid campaign and by the exploitation of captured equipment, Israel established air superiority over the Suez Canal and destroyed the majority of the SAM-2 batteries, including twelve newly arrived from the Soviet Union.[41] Israel launched deep airstrikes designed to show the Egyptian population the potential cost of Nasser's war, undermining the government and encouraging an end to hostilities. From January to April, Israel employed the recently purchased F-4 Phantom to bomb twenty-four bases, four radar stations, and multiple missile systems.[42]

The War of Attrition raid campaign provided Israel with an operational approach that led to the penetration and exploitation of the Egyptian A2AD system. Between 1967 and 1970, Israel executed dozens of raids, often using maneuver forces to support operations within the electromagnetic spectrum. Coordinated raids allowed Israel to penetrate the A2AD system, beginning with the Bulmus operations and culminating in the successful Boxer air campaign. Maneuver forces further supported the larger fight within the electromagnetic spectrum through

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[39] Cohen, *Israel's Best Defense*, 289.

[40] De Arcangelis, *Electronic Warfare*, 183-184; Asher, *The Egyptian Strategy for the Yom Kippur War*, 20; O'Ballance, *The Electronic War in the Middle East, 1968-70*, 100.

[41] Asher, *The Egyptian Strategy for the Yom Kippur War*, 31; Herzog, *The Arab-Israeli Wars*, 214.

[42] Bar-Siman-Tov, *The Israeli-Egyptian War of Attrition, 1969-1970*, 122–25; Cohen, *Israel's Best Defense*, 295–96.

Operation Raviv, which created a gap in the A2AD system along the Egyptian coast and set the conditions to steal the P-12 *Spoon Rest* radar from Ras Ghareb. The intelligence gained through the exploitation of the P-12 radar allowed future Israeli airstrikes to more effectively penetrate the Egyptian defenses, as evidenced during the bombing campaigns in 1970. Israeli success at penetrating the Egyptian A2AD network and the increasing destruction of radar and SAM-2 systems forced President Nasser of Egypt to appeal to the Soviet Union for assistance directly.

In January 1970, President Nasser and his Defense Minister, General Fawzi, traveled to the Soviet Union to request new air defense systems and aircraft to offset the Israeli ability to penetrate the existing A2AD network built around the SAM-2. By April, the Soviet Union responded by sending a division of SAM-3s, 95 MIG 21s, and more sophisticated radar equipment. With increased mobility and a smaller signature, the SAM-3s closed the low-altitude window for the IAF.[43]

By mid-April, the Soviet Union assumed control of Egyptian air defense, including SAM-2, SAM-3, ZSU-23 radar-controlled anti-aircraft guns, and MIG 21s deployed near Cairo, Aswan, and Alexandria. The increased Soviet role allowed Egyptian air defense assets and aircraft to strengthen and deepen the missile zone around the canal. Israel ceased deep airstrikes in April to avoid escalation against the Soviet Union and shifted focus entirely to the canal zone.[44] By June, the missile box around the canal included Soviet-controlled systems and improved SAM-2 missiles that increased A2AD integration and depth. Israeli aircraft losses mounted in the following weeks, with the loss of five F-4 Phantoms to the expanded missile box by the end of July. Tensions escalated again between 25 and 27 July when Israeli fighters

[43] Asher, *The Egyptian Strategy for the Yom Kippur War*, 31; O'Ballance, *The Electronic War in the Middle East, 1968-70*, 111.

[44] Bar-Siman-Tov, *The Israeli-Egyptian War of Attrition, 1969-1970*, 151–54; O'Ballance, *The Electronic War in the Middle East, 1968-70*, 115.

engaged MiG 21s flown by Soviet pilots, resulting in five Soviet aircraft destroyed.[45] With regional tensions mounting and the War of Attrition appearing to escalate into direct involvement from the United States and the Soviet Union, Egypt and Israel agreed to a cease-fire on 7 August 1970. Nasser used the cease-fire to strengthen the Suez Canal missile box further and implement lessons learned from the previous three years of conflict.[46]

In the final analysis, the Israeli raid campaign contributed to the exploitation and penetration of the existing A2AD system and prevented Egypt from accomplishing its pre-conflict political and strategic objectives. The raids allowed Israel to effectively respond to the Egyptian strategy of attrition and achieve the military goal of consolidation within the Sinai. However, Israel was not able to accomplish the larger political objective of lasting peace in the region. Egypt, while unable to regain control of the Sinai, observed Israeli actions and prepared for an expanded conflict in 1973. Israel's operational approach, including the execution of an integrated raid campaign, directly contributed to overall success between 1967 and 1970.

1973 War

Between 1970 and 1973, Egypt integrated new technologies and capabilities and continued to prepare for an inevitable confrontation with Israel. In coordination with the Soviet Union, Egypt expanded prepared air defense emplacements, moving SAM-2, SAM-3, SAM-6, ZSU-23, and radar systems near the canal, eventually extending the missile box to the eastern shore.[47] In contrast to the limited nature of the earlier conflict, Egypt, allied with Syria, prepared to pursue a large-scale war in 1973. The Soviet Union supplied Egypt and Syria with upgraded SAM-2, SAM-3, and SAM-6 systems throughout 1972. The air defense problem was much more

[45] Herzog, *The Arab-Israeli Wars*, 217–18; Abraham Rabinovich, *The Yom Kippur War: The Epic Encounter That Transformed the Middle East* (New York: Schocken Books, 2017), 37.

[46] Herzog, *The Arab-Israeli Wars,* 219-220.

[47] O'Ballance, *The Electronic War in the Middle East, 1968-70*, 128–30; Asher, *The Egyptian Strategy for the Yom Kippur War*, 71.

complicated for Israel going into the 1973 War. In contrast to the towed SAM-2 system, the SAM-3 was highly mobile and effective at low altitudes out to 34 kilometers. The SAM-6, effective out to 22 kilometers, included an advanced radar for faster target acquisition. Egypt protected each SAM battery with the radar-controlled ZSU-23 anti-aircraft gun and the SA-7 shoulder-launched missile.

Egypt also attempted to negotiate the purchase of long-range bombers to counter the Israeli ability to conduct deep airstrikes. In place of modern bombers, the Soviet Union supplied Egypt with 24 Scud missiles in April 1973. This extended the Egyptian surface-to-surface strike capability to 180 miles, further developing the A2AD system before the 1973 War. Delivery of the Scud systems, along with final shipments of SAM systems and anti-armor missiles, set conditions for Egypt and Syria to begin the large-scale war in October 1973.[48]

Egypt finalized an agreement with Syria to initiate a war with Israel in 1973. In the intervening years between the War of Attrition and the 1973 War, Egypt and Syria created a modern and integrated A2AD system that included capabilities to deny access to the air, land, and maritime domains. In contrast, Israel continued to invest in armor and air forces, confident in their continued capability to dominate the land and air domains.[49] In comparison to the War of Attrition, the war in 1973 expanded to a higher intensity and larger scale in a shorter period.

Beginning on 6 October 1973, Egypt aimed to precipitate a general war with Israel for a limited political objective. A large-scale war could break the political stalemate between Israel, Egypt, and the international community and generate the momentum necessary to return the Sinai Peninsula and Gaza to Egypt. The more significant Egyptian problem remained the implementation of a military strategy that allowed for a limited ground penetration across the

[48] Edgar O'Ballance, *No Victor, No Vanquished: The Arab-Israeli War, 1973* (Novato, CA: Presidio Press, 1997), 21; Herzog, *The War of Atonement*, 31; Asher, *The Egyptian Strategy for the Yom Kippur War*, 10.

[49] Rabinovich, *The Yom Kippur War,* 50.

Suez Canal while simultaneously protecting the ground forces from the Israeli air and armored strikes.[50] President Sadat of Egypt described the military objective in 1973 as an unlimited attack across the Suez Canal to gain a limited foothold in the Sinai and defeat the Israeli military doctrine. The Egyptian military planned to cross the canal with a combat force, protected by an A2AD system that could inflict unsustainable losses on Israeli forces.[51]

Egypt and Syria finalized plans for the combined offensive against Israel, called Operation Badr, in May 1973. The plan called for a limited offense from Egypt along the Suez Canal's length to seize terrain on the eastern bank. The Egyptian strategy relied on a rapid offensive to hold terrain a few kilometers east of the Suez Canal. Infantry, armed with anti-tank rockets and new Sagger anti-tank missiles, would initially defeat any IDF armor counterattack, supported by artillery, surface-to-surface missiles, and the integrated SAM missile box over the canal.[52] With a foothold on the eastern side of the canal protected by an A2AD system, Egypt planned to stage armor formations to retain the foothold and for a possible offensive to seize the Sinai. To support this effort, Egypt planned to air assault large commando forces into the Sinai to disrupt Israeli military counterattacks and the mobilization of the Israeli reserve.[53]

Using the experience gained during the War of Attrition, Egypt updated and expanded its A2AD system. Egypt viewed the increased capability of the A2AD system as the primary means to protect the ground force and achieve political and strategic objectives. By October 1973, Egypt employed 150 SAM batteries, primarily a mix of SAM-2, SAM-3, and SAM-6 systems. Egypt concentrated 50 systems along the Suez Canal, making the A2AD zone in 1973 much more deadly than in 1970. The SAM-6 used the *Straight Flush* radar system, which Israel was unable to

[50] Asher, *The Egyptian Strategy for the Yom Kippur War,* 59.

[51] Asher, *The Egyptian Strategy for the Yom Kippur War*, 61.

[52] Ibid., 74–75; Rabinovich, *The Yom Kippur War*, 33.

[53] Asher, *The Egyptian Strategy for the Yom Kippur War*, 76; Herzog, *The Arab-Israeli Wars*, 242.

defeat.[54] The integration of SAM batteries with modern radar systems provided Egypt with a missile defense zone that covered all altitudes and extended 15 miles across the canal into Israel. This gave Egypt a significant advantage in any planned crossing by denying Israel air support. In execution, the A2AD system in place around the canal was so effective that by the end of the first day of the war, aircraft losses forced Israel to restrict all air operations within 15 kilometers of the Suez Canal.[55]

The maritime domain increased in relevance as the scope and scale of the conflict expanded in 1973. During the War of Attrition, Egypt and Israel maintained unofficial neutrality on the harassment or destruction of oil fields or shipping within the Gulf of Suez and the Red Sea. The nature of the War of Attrition meant that all parties avoided actions that might cross the threshold towards large-scale war.[56] In contrast, the 1973 War included fewer concerns over escalation, save for the general interest in keeping the United States and the Soviet Union from open conflict. This resulted in more aggressive naval engagements between Egypt, Syria, and Israel as all parties pursued sea control.

At the onset of the war, Egypt implemented a naval blockade in the Red Sea and attempted a large air assault into the Sinai to seize key terrain, specifically the Israeli port at Sharm al-Sheikh.[57] By 1973, both Egypt and Syria controlled missile ships purchased from the Soviet Union. Egypt crewed twelve *Osa* and seven smaller *Komar* class missile boats, with four *Komars* operating in the Red Sea theater. Syria crewed three *Osa* and six *Komar* class ships, all in the Mediterranean.[58] Egypt intended to establish sea control in 1973, with 50 ships at sea. At

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[54] De Arcangelis, *Electronic Warfare,* 190-191.

[55] Robert P. Givens, "Turning the Vertical Flank" (Air University Press, 2002), 34, 37.

[56] Rabinovich, *The Boats of Cherbourg,* 191.

[57] Herzog, *The War of Atonement*, 267.

[58] "The Middle East and the Mediterranean," *The Military Balance* 73, no. 1 (January 1973): 31, 36, accessed 20 March, 2021, https://doi.org/10.1080/04597227308459831; Herzog, *The Arab-Israeli Wars*, 311.

1300 on 6 October, Egypt ordered warships from ports in Safaga and Aden to close the Straits of Tiran, the Gulf of Suez, and the Bab el Mandeb to all Israeli maritime traffic.[59]

Israeli strategic considerations in 1973 resembled those from the War of Attrition. Israel depended on timely and accurate intelligence on any impending large-scale attacks to trigger the mobilization of the reserve. Israeli offensive doctrine relied on the superior air and armor forces to destroy attacking formations. Israel believed that Egypt would not initiate a war until they possessed parity within the air force and modern long-range missiles that could strike Tel Aviv from Egypt. Known as "the concept" within Israel, this line of thinking blinded Israeli intelligence to political developments in Egypt that signaled a shift in short-term objectives, away from an unrestricted war to eliminate Israel as a nation and towards a limited objective that restored territory and prestige to the Egyptian military.[60]

Israel faced a more comprehensive A2AD environment in 1973. The expansion of Egyptian air defense, both in terms of numbers and capabilities, posed a threat to an Israeli offensive doctrine that relied on airpower. The Egyptian and Syrian maritime power also threatened to isolate Israel from international support. Since 1967, Israel increasingly relied on air and armor to achieve a quick and decisive victory. The poor performance by Arab belligerents in earlier conflicts only served to amplify the sense of superiority in the IDF leading up to October 1973. The Egyptian operational approach came as a surprise to Israel during the 1973 War and it led Israel to merge new technologies with previous lessons learned to penetrate and operate within the A2AD system.[61]

Israel faced a maritime threat in the 1973 War that did not exist in the limited conflict between 1967 and 1970. Within the context of large-scale combat operations, Syria and Egypt

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[59] O'Ballance, *No Victor, No Vanquished*, 153.

[60] P. R. Kumaraswamy, ed., *Revisiting the Yom Kippur War*, Cass Series--Israeli History, Politics, and Society 5 (Portland: Frank Cass, 2000), 4–7; Rabinovich, *The Yom Kippur War*, 25.

[61] George W. Gawrych, "The 1973 Arab-Israeli War: The Albatross of Decisive Victory," The Leavenworth Papers (Fort Leavenworth, KS: Combat Studies Institute, 1996), 5-6.

intended to establish a maritime blockade of Israel in the Mediterranean Sea through integrated coastal radar, artillery, and missile boats equipped with the Styx anti-ship missile. However, Israel adopted a new capability to penetrate and operate within the expanded A2AD environment.

Using *Saar* and *Reshef* missile boats, Israel quickly established sea control in the Mediterranean, isolated the Egyptian and Syrian belligerents from each other, and limited both countries' ability to resupply during the war.[62] In two naval engagements, Israel established sea control and helped set conditions for naval commando operations that cut the lines of communication and coordination between Egypt and Syria. Facing a large-scale conflict and caught geographically between Egypt and Syria, Israel used revolutionary maritime technology to penetrate the littoral A2AD system and win the decisive battle for access to the Mediterranean Sea line of communication.

At the Battle of Latakia, the first of two major sea battles, Israel used electronic warfare systems on missile boats to penetrate a portion of the Syrian maritime A2AD system. On the night of 6 October, only hours after the Egyptians and Syrians initiated their attacks into Israel, five Israeli missile boats, including four *Saars* and one *Reshef*, sailed towards the coast of Syria. Israel intended to draw out and destroy the Syrian missile boats at the Port of Latakia. Syria employed two *Komars* and one *Osa* in the engagement, along with a torpedo boat and minesweeper acting as naval pickets.

In the first naval missile engagement in history, Syrian ships targeted the *Reshef* with a salvo of missiles at 37 kilometers. Israeli ESM and ECM worked as intended, causing all incoming missiles to miss. Israeli missile boats then closed the distance to 23 kilometers, destroying two *Komars* and one larger *Osa* within an hour and a half.[63] This first naval engagement of the 1973 War demonstrated the potential of electronic warfare in the maritime

[62] Rabinovich, *The Boats of Cherbourg,* 41-42.

[63] Ibid., 214-222.

domain. Much like the use of jammers and deception pods on aircraft, the Israeli naval ECM and ESM enabled the INS to penetrate and operate within a portion of the A2AD system. Shore-based radar installations and artillery also failed to target the Israeli missile ships. The victory at Latakia partially set conditions for Israeli sea control in the Mediterranean Sea.

To establish sea control in the Mediterranean, the INS sailed on 8 October towards Egypt and an engagement at Baltim. Six INS missile boats sailed for Port Said off the Egyptian coast to intercept four *Osas* from the Egyptian navy transiting from Alexandria. The *Osas* launched twelve Styx missiles at the Israeli flotilla at 38 kilometers. Once again, Israeli ECM, ESM, and chaff defeated all incoming missiles. The Israeli missile boats closed on the Egyptian ships for 20 minutes before attacking, with three *Osas* destroyed and one damaged.[64] With the destruction of a significant portion of the Egyptian and Syrian missile boats in the Mediterranean, both Egypt and Syria kept their remaining naval assets inside defended anchorages, only occasionally firing from the shelter of ports. Israeli missile boats also engaged Egyptian and Syrian ground-based radar stations, further reducing the overall effectiveness of the A2AD system. Throughout the war, adversaries fired 52 missiles at Israeli ships, missing every time.

In contrast, Israel destroyed 19 Egyptian and Syrian vessels. This effectively ended any chance to blockade or isolate Israel from resupply. It also provided Israel with the opportunity to isolate Egypt and Syria.[65] On 16 October, with sea control confirmed, Israeli air and naval forces prevented three Soviet freighters from offloading supplies needed by the Syrians to continue the war effort. The Soviet inability to resupply Syria resulted in deteriorating relations between the two allies. By 18 October, Israeli naval commandos severed underwater telex and telecommunications cables used by Syria and Egypt to coordinate their war effort. The underwater cables provided secure channels between Egypt and Syria; the destruction of the lines

[64] De Arcangelis, *Electronic Warfare*, 200.

[65] Herzog, *The War of Atonement*, 264-269.

forced both countries to revert to radio communications, which Israeli intelligence could monitor and exploit.[66]

Israel achieved maritime superiority in the Mediterranean Sea with revolutionary technology built into new missile boats, and they refined applicable naval and aerial doctrine before the war in realistic training simulators.[67] In large-scale conflict, Israel demonstrated that successful operations within an A2AD environment require dominance within the EMS. The missile boats, equipped with ECM and ESM, penetrated the maritime A2AD system and destroyed adversary ships and radar installations.[68] Much like in the War of Attrition, this created gaps in coverage and allowed Israel to destroy portions of the command and control network that supported the more expansive A2AD system. The naval battles during the 1973 War also reinforced the significance of signals intelligence and the ability to exploit intelligence to gain or maintain an advantage.[69]

Israel was unable to station missile boats in the Red Sea before the war in 1973. This created a potential force disadvantage considering the two Egyptian missile boats based at the Hurgada anchorage. Sixty miles west of the primary Israeli naval base at Sharm al-Sheikh in the Sinai, Hurgada played a significant role in the Egyptian Red Sea A2AD system. Hurgada provided Egypt with a strategic port capable of controlling access to the Gulf of Suez. The A2AD system in the Gulf of Suez included SAM-2 and SAM-3 batteries, a radar station on Shadawan Island, coastal defense artillery, access to air support from the Egyptian Air Force, and two *Komar* missile boats. Together, the air and maritime defense zone extended 20 to 25 nautical

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[66] O'Ballance, *No Victor, No Vanquished,* 157.

[67] Rabinovich, *The Boats of Cherbourg*, 182–87; Shmuel Gordon, "The Air Force and the Yom Kippur War: New Lessons," in *Revisiting the Yom Kippur War*, ed. P. R. Kumaraswamy (Portland: Frank Cass, 2000), 222–23.

[68] Dov S. Zakheim, "The United States Navy and Israeli Navy: Background, Current Issues, Scenarios, and Prospects" (CNA: Strategic Studies Division, February 2012), 5, accessed 20 March, 2021, https://www.cna.org/cna_files/pdf/D0026727.A1.pdf.

[69] De Arcangelis, *Electronic Warfare,* 203-204.

miles into the Gulf of Suez.[70] Without missile boats to help penetrate the A2AD system, Israel returned to an operational approach used during the War of Attrition by conducting raids to create a window of opportunity as part of a larger campaign.

A primary mission of the INS headquarters in the Red Sea theater involved planning for an amphibious operation across the Gulf of Suez. Referred to as Operation Ohr Yarok (Green Light), the plan called for the six landing craft at Sharm al-Sheikh to deliver a mechanized force across the Gulf of Suez in a strategic envelopment of Egyptian positions along the Suez Canal. Operationally, Ohr Yarok resembled Raviv, the amphibious raid executed during the War of Attrition, but on a larger scale and linked directly to IDF actions around the Suez Canal.

Operation Ohr Yarok required sea control, which could only occur after the neutralization of the two *Komars* located at Hurgada. The *Komars* posed a lethal threat to any Israeli amphibious force. Further complicating the problem, the IAF could not support the location or destruction of the Egyptian ships due to the air defense located around Hurgada and Shadawan island and the intensity of the fighting along the Suez Canal and in the Golan.[71] Lacking a missile boat option, Israel tasked the naval commandos from Shayetet 13 to destroy the *Komars*.

Between 9 and 14 October, Israel examined the practicability of executing Ohr Yarok. A strategic envelopment in the Red Sea could relieve pressure on Israeli forces fighting in the Sinai, especially considering the renewed Egyptian offensive that began on 14 October. Ohr Yarok gained more importance as Israel planned to counterattack across the canal near Great Bitter Lake; an amphibious raid would fix Egyptian forces and prevent any reinforcement at the designated crossing site. Israel tasked Shayetet 13 at Sharm al-Sheikh with the neutralization of the *Komars* in anticipation of approval to execute Ohr Yarok. The use of the commandos allowed

[70] Almog, *Flotilla 13*, 143.

[71] Rabinovich, *The Boats of Cherbourg*, 269.

Israel to penetrate the A2AD system around Hurgada covertly, setting conditions for a larger operation that would include an amphibious assault and airstrikes.

Beginning on 9 October, naval commandos executed four raids against the Hurgada anchorage. In the first attempt, the commandos used long-range rubber craft to reach the Egyptian coast, then swam to the anchorage entrance. Patrolling ships prevented the commandos from identifying the missile boats.[72] Shayetet 13 infiltrated the anchorage again on 11 October. This time, the team identified a stationary *Komar* and placed limpet mines on the hull, successfully destroying it.[73]

On 14 October, one *Komar* remained active at Hurgada, forcing Israel to postpone that execution of Ohr Yarok until the destruction of the second missile boat. Following a third attempt to locate and destroy the final missile boat on 17 October, the naval commandos conducted a fourth and final effort on 21 October. The commandos, employing low-profile speedboats, located the final *Komar* and destroyed it with multiple shoulder-launched rockets.[74] The destruction of both *Komars* stationed at Hurgada forced Egypt to close the anchorage and relocate further south, away from future Israeli attacks. The closure of Hurgada effectively ended the A2AD threat around the Gulf of Suez. However, by 23 October, Israeli armored forces were across the canal and closing on the Egyptian Third Army, removing the strategic necessity to conduct Ohr Yarok.[75]

In the Mediterranean Sea, Israel employed maritime and air assets to establish sea control and limit Egyptian and Syrian operational coordination. *Saar* and *Reshef* missile boats, combined with land-based aircraft and naval commandos, allowed Israel to isolate Egypt and Syria. Lacking missile boats in the Red Sea theater, Israel conducted multiple raids using commandos to covertly

[72] Almog, *Flotilla 13*, 160-163.

[73] Ibid., 166-167.

[74] Ibid., 182-183.

[75] Rabinovich, *The Boats of Cherbourg*, 297-300.

penetrate the A2AD network around Hurgada, accomplishing assigned tasks to establish operational access. Commandos helped set conditions for the strategic envelopment of Egyptian forces along the Suez Canal with the destruction of the two *Komar* missile ships. Israel employed a similar operational approach during the War of Attrition, completing successive raids that established windows of operational access. As the scale of conflict expanded in the 1973 War, the use of raids allowed Israel to gain freedom of action for follow-on operations.

Conclusion and Recommendations

Israel successfully operated within adversary littoral A2AD environments during limited and large-scale war. Between 1967 and 1970, the proliferation in Egypt of Soviet air defense, artillery, anti-ship missiles, and radar technology forced Israel to adapt multi-domain methods to penetrate the A2AD environment during a limited war. By 1973, Egypt expanded and improved its A2AD system and launched a large-scale conflict that relied heavily on the protection provided by that system. Israel applied some lessons learned from the War of Attrition and adopted new techniques to address Egyptian A2AD. Israeli actions during the War of Attrition and the 1973 War provide three primary lessons for the US Marine Corps as it considers how to think about future A2AD environments.

First, within the context of low-intensity conflict, designing a campaign of raids creates opportunities to penetrate and operate within A2AD systems while remaining below the threshold of large-scale war. The second lesson, related to the first, is that sustained operations within an A2AD environment require acknowledging the fleeting nature of each penetration. Finally, given the expansion of activity within the EMS since 1973, penetration of an A2AD system may require a shift towards maneuver forces supporting operations within the EMS rather than the traditional understanding of manipulating the EMS to support operational maneuver.

During low and high-intensity conflict within an A2AD environment, Israel's operational approach centered on raiding to target specific systems, creating windows of opportunity for

follow-on operations. During the War of Attrition, the Israeli raid campaign included the destruction or exploitation of radar equipment at Ras Adabiyah and Green Island and the destruction of P-183 patrol boats, which created the gap in A2AD coverage necessary for successive raids during Operations Boxer and Raviv.

In low-intensity conflict, developing a campaign of raids allows for cross-domain synergy, where land or maritime forces create gaps or collect intelligence throughout the EMS, setting conditions for further aerial raids, which then enable additional raids across domains. In large-scale or high-intensity conflict, such as during the 1973 War, Israeli missile boats created a maritime gap in the Egyptian and Syrian A2AD system in the Mediterranean Sea, allowing later raids to sever the telecommunication cables that enabled adversary command, control, and coordination.

In the Red Sea, Shayetet 13 destroyed two Egyptian missile boats and forced Egypt to close a strategic port, creating the window of opportunity for Operation Ohr Yarok and the amphibious envelopment of Egyptian forces in the Sinai. Looking to the future, successive raiding within a littoral A2AD environment by a dedicated force may provide the means to establish operational access in low and high-intensity conflict. Israel used naval commando forces in the littoral environment to create temporary gaps in the A2AD system for exploitation by other air and naval operations. This operational approach may apply to the US Marine Corps in similar environments.

The use of raids to establish operational access leads to the second lesson from the case studies. Future operations within a littoral A2AD environment require a change in mindset. Operational planners should view the penetration or exploitation of an A2AD system, through raiding or a different operational approach, like an obstacle reduction or gap crossing. Formations at every echelon own some inherent capability to reduce obstacles or cross gaps, with capability expanding as unit size increases. When crafting an operational approach, planners account for

obstacles and gaps in drafting the plan, often assigning specific capabilities to units tasked with addressing the obstacle or gap.

Similarly, nodes within the larger A2AD environment represent obstacles, and each operation must account for penetration or exploitation of the system. In the cases above, Israel sequenced raids, with each raid creating a window of opportunity for later operations. In some instances, the Egyptians closed or repaired the gap in A2AD coverage created by Israeli raids, such as the relocation of mobile SAM systems or the stationing of patrol boats in the Red Sea. Operations Boxer, Raviv, and Ohr Yarok required the Israeli military to shape the A2AD environment, often through raids that reduced or degraded portions of the larger system for a limited period. Treating the penetration or exploitation of an A2AD system as an obstacle reduction or gap crossing also implies that future forces require inherent capabilities to conduct in-stride actions, with access to enhanced capabilities managed by larger formations.

Finally, militaries throughout the world increasingly rely on the EMS to communicate, support situational awareness, navigate, and integrate various offensive and defensive systems. Traditionally, operational planners incorporate manipulation of the EMS into developing courses of action to support friendly maneuver or gain an advantage over an adversary. However, the Israelis often used maneuver forces in support of operations within the EMS. Many of the raids during the War of Attrition and the 1973 War physically reduced Egyptian A2AD nodes, but several raids also captured targeted equipment for exploitation. Radar systems and intelligence captured by the Israelis led to improved ECM and increased the likelihood of successful penetration during later operations. In future operations in A2AD environments, ground or maritime forces may support larger operations within the EMS through targeted raids designed to collect intelligence or increase awareness of adversary capabilities, creating cross-domain synergy for the larger force.

The Israeli experiences in penetrating A2AD systems during a low and high-intensity conflict between 1967 and 1973 provide the US Marine Corps with valuable insight into similar

operations in future operating environments. Service concepts, such as those outlined in the EABO handbook and LOCE, supply a general framework for what and why the US Marine Corps will focus on littorals and A2AD environments. The Israeli experiences between 1967 and 1973 provide the service with several methods that worked in the past and point to recommendations for how to operate within contested littorals in the future. As part of the joint force, the US Marine Corps must continue to develop the ability to establish operational access in contested littoral environments. The Israeli case studies reinforce the need for service concepts that incorporate raiding as an integrated campaign to establish operational access in future operating environments.

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