

~~TOP SECRET~~
NO FOREIGN DISSEM

Copy 142 of 175 copies

WSEG REPORT 249

ASSESSMENT OF THE WEAPONS AND TACTICS USED
IN THE OCTOBER 1973 MIDDLE EAST WAR (U)

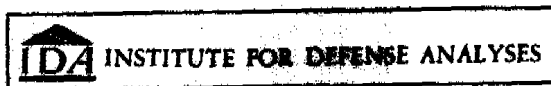
October 1974

Including
IDA REPORT R-205

J. R. Transue, Project Leader

JAN 10 11 00 AM '75
RECEIVED, NSS

OSD, DIA, USAF,
ARMY, JCS
reviews complete



WEAPONS SYSTEMS EVALUATION GROUP
400 ARMY-NAVY DRIVE, ARLINGTON, VA.

~~TOP SECRET~~
NO FOREIGN DISSEM

Log No. 301137

Classified by Director, WSEG

**EXEMPT FROM GENERAL DECLASSIFICATION
SCHEDULE OF EXECUTIVE ORDER 11652
EXEMPTION CATEGORY 2
DECLASSIFY ON N/A**

NATIONAL SECURITY INFORMATION

**Unauthorized Disclosure Subject to
Criminal Sanctions**

NO FOREIGN DISSEM

The information contained in the attached document will not be disclosed to foreign nationals without the express approval of the head of the originating office. Approval shall refer specifically to this document or to specific information contained herein.

In addition to security requirements which apply to this document and must be met, each transmittal outside the agencies of the U.S. Government must have prior approval of the Director of Defense Research and Engineering, Washington, D.C. 20301.

Further reproduction of this document is prohibited without prior approval of the director of Defense Research and Engineering, Washington, D.C. 20301



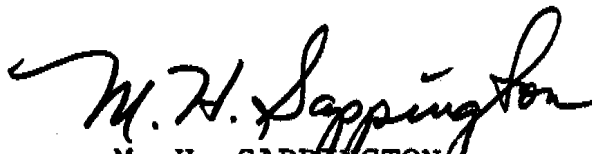
WEAPONS SYSTEMS EVALUATION GROUP
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202

MEMORANDUM FOR THE DIRECTOR, NET ASSESSMENT

SUBJECT: Assessment of the Weapons and Tactics Used in the October 1973 Middle East War (WSEG Report 249) (U)

Reference: Your Memorandum for the Director, Weapons Systems Evaluation Group, Subject: Follow-on Study of the October 1973 Arab-Israeli War, dated 12 June 1974 (U)

1. This study, WSEG Report 249, is responsive to referenced memorandum.
2. The conclusions and lessons learned presented in this report are consistent with the assessments and inferences presented in WSEG Report 225. This report, however, is broader in scope and was prepared to serve a different purpose. It should not be considered as an update or expansion of the earlier report.


M. H. SAPPINGTON
Rear Admiral, USN
Acting Director

TOP SECRET

NO FOREIGN DISSEM

REPORT R-205

ASSESSMENT OF THE WEAPONS AND TACTICS USED IN THE OCTOBER 1973 MIDDLE EAST WAR (U)

J. R. Transue, *Project Leader*

R. J. Braitsch	L. T. Erickson , Col. USMC
W. O. Breuhaus	J. F. Dinwiddie , Col. USAF
K. C. Chan	C. R. Gentzel Col. USAF
R. P. Gogolewski	D. V. Murray , Capt. USN
J. K. Moriarty	O. F. Spencer , Col. USA
J. Nakhleh , CNA	A. L. Villaret , Col. USAF
P. Y. Okamoto	B. F. Williams, Col. USA
T. P. Stanley	

October 1974

This report has been prepared by the Systems Evaluation Division of the Institute for Defense Analyses in response to the Weapons Systems Evaluation Group Task Order DAHC 15 73 C 0200 T- 224, dated 3 July 1974.

In the work under this Task Order, the Institute has been supported by military personnel assigned by WSEG.



INSTITUTE FOR DEFENSE ANALYSES
SYSTEMS EVALUATION DIVISION
400 Army-Navy Drive, Arlington, Virginia 22202

TOP SECRET

NO FOREIGN DISSEM

Classified by DD Form 254
Contract DAHC-15-73-C-0200, WSEG
31 October 1973

UNCLASSIFIED

CONTENTS

Preface ix

Part 1—Introduction

Part 2—Discussion and Summary

A. The War in General 3

B. The Ground War 5

 1. Armor Forces 5

 2. Antitank Weapons 8

 3. Artillery 10

 4. Night Vision Devices and Night Operations 12

 5. Physical Barriers 12

 6. CBR Equipment 12

 7. Electronic Warfare in the Ground War 13

 8. Ground-Based Air Defense 13

C. The Air War 15

 1. Inventories of Israeli and Arab Combat Aircraft 15

 2. Inventories of Israeli and Arab Ordnance 16

 3. Close Air Support 17

 4. Employment of Air Power Against Armor 18

 5. Use of EO Guided Weapons 19

 6. Attack of Aircraft on the Ground 20

 7. Air-to-Air Combat 20

 8. Aircrew Training 21

 9. Aerial Reconnaissance 21

 10. Electronic Warfare in the Air War 22

D. The Sea War 22

 1. Inventories of Boats and Ships 23

 2. Missile Boat Engagements 23

 3. Shore Bombardment 24

 4. Commando Operations 24

 5. Mining Operations 25

 6. Submarine and Antisubmarine Warfare 25

 7. Naval Blockade 25

E. Concluding Remarks 26

Part 3—Analyses

I. THE WAR IN GENERAL 29

 A. Background 29

 B. The Preparations 30

UNCLASSIFIED

UNCLASSIFIED

C. The Arab Attack	32
1. The Sinai	32
2. The Golan Heights	33
D. Egyptian Breakout Attempt and Israeli Counterattack	36
E. Miscellaneous Aspects of the War	39
1. The Naval War	39
2. Soviet Influence on the Arab Forces	39
3. Arab Intelligence Operations	39
4. Arab Logistics	39
5. Military Cooperation Between Arab Governments	40
II. THE GROUND WAR	41
A. Inventory of Weapons and Ordnance for Israel, Egypt, and Syria	41
B. Interactions of Ground Forces	41
1. Armor	41
2. Antiarmor	52
3. Artillery	57
4. Infantry Special Forces	62
5. Night Operations	63
6. Physical Barriers	64
7. Chemical-Biological-Radiological Equipment	66
8. Electronic Warfare	67
C. Ground-Based Air Defense	68
1. Inventories	68
2. Israeli Ground-Based Air Defense	69
3. Arab Ground-Based Air Defense	70
4. Mobility as a Factor in Air Defense	71
5. Command and Control and Identification of Friend or Foe	71
6. Passive Measures To Counter Air Threat	73
7. Air Defense Suppression	73
III. THE AIR WAR	75
A. Inventories of Israeli and Arab Combat Aircraft	75
1. Inventories	75
2. Sortie Activity	77
3. Attrition	77
4. Effect of Aircraft Resupply Efforts	77
B. Inventories of Israeli Airborne Ordnance	80
C. Close Air Support	82
1. Israeli CAS	82
2. Arab CAS	84
D. Employment of Air Against Armor	84
1. Examination of Killed Tanks	85
2. Air Action Against Tanks on the Syrian Front	85
3. Air Action Against Tanks on the Egyptian Front	86
E. Use of Electro-Optical Guided Weapons	86
1. EO Guided Weapon Expenditures	86
2. Employment of EO Guided Weapons	87
3. Effectiveness of EO Guided Weapons	87

UNCLASSIFIED

UNCLASSIFIED

F. Attack of Aircraft on the Ground 89
G. Air-to-Air Combat 90
H. Aircrew Training 92
I. Aerial Reconnaissance/Surveillance 94
 1. Resources, Characteristics, and Activity 94
 2. Effect of Ground-Based Air Defense 96
 3. Timeliness of Intelligence From Aerial Reconnaissance 96
J. Electronic Warfare 96
 1. Onboard Electronic Warfare Systems 97
 2. Support Jamming 97
 3. Chaff 98
IV. THE SEA WAR 99
 A. Missile Boat Engagements 100
 B. Missile Boat Tactics 101
 1. Israeli Navy SAAR Tactics 101
 2. Arab OSA/KOMAR Tactics 103
 C. Command, Control, and Communications 104
 D. Effectiveness of Israeli Navy Antiship Missile Defense 104
 1. STYX Performance 104
 2. Effectiveness of Israeli Navy Electronic Warfare 105
 3. Effectiveness of Self-Defense Guns 106
 4. Effectiveness of GABRIEL Missile 106
 E. Other Naval Operations 107
 1. Shore Bombardment 107
 2. Commando Operations 108
 3. Mining Operations 109
 4. Submarine and Antisubmarine Warfare 109
 5. Bab el Mandeb Blockade 110
 F. Summary and Conclusions 111

Appendices

- A. ISRAELI LESSONS LEARNED FROM THE GROUND WAR
- B. BIBLIOGRAPHY

UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED**TABLES**

1	Prewar Inventories of Armor	5
2	Prewar Inventories of Antitank Weapons	8
3	Prewar Inventories of Artillery	10
4	Prewar Inventories of Ground-Based Air Defense Weapons	14
5	Prewar Inventories of Combat Aircraft	15
6	Prewar Inventories of Boats and Ships	23
7	Inventory of Principal Israeli Weapons	42
8	Inventory of Principal Israeli Ordnance	43
9	Inventory of Principal Arab Weapons	44
10	Main Battle Tanks	45
11	Distribution of Impacts and Perforations on 435 Arab Tanks	47
12	Mechanized Infantry Combat Vehicles	51
13	Infantry Antitank Weapons	53
14	Prewar Artillery Inventories of Israel, Egypt, and Syria	58
15	Comparison of Principal U.S. and Soviet Artillery Employed in War	58
16	Israeli/Arab Aircraft Inventories at Start of 1973 War	76
17	Aircraft Losses by Cause	79
18	Total Weight of Israeli Air Ordnance (short tons)	80
19	Estimated Israeli Air Ordnance Inventory and Expenditures	81
20	Performance of the Soviet FISHBED-J and FRESCO-D Relative to the U.S. F-4E (with Leading Edge Slats)	91
21	U.S. and Israeli Annual Training Sorties Flown	93
22	Comparison of Egyptian, Israeli, Soviet, and U.S. Training Programs	94
23	Aerial Reconnaissance/Surveillance Resources Used in Israeli/Arab Combat Areas	95
24	Israeli Naval Order of Battle	100
25	Egyptian and Syrian Naval Orders of Battle and Losses	101

UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED

PREFACE

(U) Public Law 93-199 requires the Secretary of Defense to undertake a study of the effectiveness of the foreign military assistance program as it relates to the October 1973 Middle East War. In response to direction from the Deputy Secretary of Defense, the Director of Net Assessment requested the Weapons Systems Evaluation Group and several other agencies of the Department of Defense to conduct appropriate portions of the study. The present report was prepared by analysts at the Institute for Defense Analyses, the Center for Naval Analyses, and WSEG, and it constitutes a part of the basis for the report to Congress. Analysts at the same three organizations also collaborated in an earlier study: *Preliminary Assessment of the Effectiveness of Weapons Systems Used by Opposing Forces in the October 1973 Middle East War*, WSEG Report 225, February 1974. The present report was prepared for a different purpose and treats a broader scope. It should not be construed as an update of WSEG Report 225.

(U) The present study was possible only because of information acquired through the efforts of many people. Of particular significance in this regard was a joint U.S.-Israeli group that gathered and compiled data on the military aspects of the war. This group, known as the Data Acquisition Team and led by WSEG, resulted in much of the information contained in this report.

(U) The analysts of IDA, CNA, and WSEG who conducted the present study are listed on the title page of this report. Their diligent and persistent efforts in reviewing and analyzing data and in preparing the text are gratefully acknowledged. Direction of the study and coordination with WSEG was very much facilitated by the efforts of Col. L. T. Erickson, the WSEG Project Officer.

(U) One further contribution required special recognition. This was the excellent editorial assistance provided by Mr. Leonard Eggert. His efforts greatly improved the report, making it both easier to read and easier to understand.

J. R. T.
30 October 1974

UNCLASSIFIED

UNCLASSIFIED

x

UNCLASSIFIED

Part 1

Introduction

UNCLASSIFIED

Introduction

(U) In December 1973, the U.S. Congress approved a \$2.2 billion appropriation for emergency military assistance or foreign military sales credits to Israel. Congress noted that large sums of money are used for such programs throughout the world and that in the case at hand there was an opportunity to study the effectiveness of the program. Accordingly, the appropriations measure requires that the Secretary of Defense conduct a study "to ascertain the effectiveness of the foreign military assistance program as it relates to the Middle East conflict, including weapons that the United States is providing to Israel through military assistance programs and to compare them to the effectiveness of the weapons which the Soviet Union is providing to the Arab States."¹

(U) The present report treats one aspect of the subject posed by Congress, viz., the effectiveness of weapons provided by the United States and the Soviet Union. This treatment necessarily considers the quantities of such weapons and the manner in which they were used (i.e., the doctrine and tactics), as well as the weapon characteristics. Israel used many weapons produced by the United States, and the Arab nations used many weapons produced by the Soviet Union. Additionally, the doctrine and tactics of the several combatants reflect in varying degrees the doctrine and tactics of the United States and the Soviet Union.

(U) There are several cases in which the success of the Israelis cannot be explained in terms of weapon characteristics and quantities or in terms of doctrine. This led to a limited investigation of the selection, training, and promotion policies of the combatants. It also happens that there are cases in which weapons employed by one side do not have counterparts on the other. Some of these cases are important, so they, too, have been addressed.

(U) In fact, a rather liberal interpretation has been taken with respect to the Congressional direction, with the result that this report contains (1) direct comparisons of weapon effectiveness in battle, (2) descriptions and comparisons of weapon characteristics, (3) descriptions of doctrine, tactics, and training, and (4) lessons learned with respect to needed weapon characteristics and tactics.

(U) This report does not, however, address the international or national political aspects of the war, the economic aspects of the war, or the intertheater and intratheater logistic aspects of the war. While definite improvements in Arab capabilities from 1967 to 1973 are apparent in several areas, there is no attempt to extrapolate the trend.

1. (U) Public Law 93-199, Section 5.

UNCLASSIFIED

UNCLASSIFIED

(U) The study drew upon all sources that were available and classified no higher than TOP SECRET. In addition to the sources used in an earlier WSEG study of the war,² the present study group made use of numerous reports issued by the Israel Defense Forces, studies performed by the U.S. Department of Defense, and the extensive files of interviews and questionnaire responses compiled by the U.S. Data Acquisition Team.³ Even so, the analysts conducting the present study were severely constrained by a lack of information. For practically every subject addressed, the conclusions are less definite than might be desired because every effort has been made to state only that for which a reasonable basis can be established.

(U) In large measure, the lack of information resulted from the limited time that was available to record events as they occurred and from the imperfect memories of the people who recorded these events. Even in the Southeast Asia conflict, where the U.S. forces were directly involved and where the intensity of the war was far less than that in the Middle East, data were often incomplete or unreliable. In addition, there are strong indications that the United States has not been provided with all of the data that are available to the Israelis. Small wonder, then, that there should be gaps in our knowledge of the October 1973 Middle East War.

(U) There is still another limitation to the information: nearly all of the data, whether related to the Israeli or Arab forces, were obtained from Israeli sources. If previous experience with U.S. forces is a guide, the information obtained contains distortions unknown to the collector. On the other hand, one should expect that data on Israeli inventories, expenditures, and losses are reasonably accurate. Furthermore, the Israelis made a conscientious effort to verify claims of Arab weapons destroyed, particularly aircraft and tanks, and they apparently did not provide estimates without a reasonable basis. Therefore, while information is lacking in many areas, it is probably of as high quality as could be expected.

(U) This report is divided into three parts. Part 2, Discussion and Summary, is intended to be most directly useful in the preparation of the report to Congress. It is a succinct treatment of subjects thought to be of considerable importance and interest. It concludes with a listing of the salient observations and lessons learned. Additional discussion and supporting data are provided in Part 3.

2. (U) WSEG Report 225, *Preliminary Assessment of the Effectiveness of Weapon Systems Used by Opposing Forces in the October 1973 Middle East War*, Weapons Systems Evaluation Group, February 1974, TOP SECRET NOFORN/U.S. EYES ONLY.

3. (U) An annotated bibliography listing the principal information sources is contained in Appendix B at the end of this report. Several of the reports that are referenced frequently are denoted by a short title (e.g., Casey Report) after the full reference is given once.

UNCLASSIFIED

Part 2

Discussion and Summary

SECRET

Discussion and Summary

(U) This part of the study first presents a brief account of the war in general. The purpose of this discussion is to highlight the principal events of the war and thus to provide a brief context for subsequent discussions of the specific areas of warfare: the ground war, the air war, and the sea war. The final section presents the salient observations pertaining to the preceding discussions. The organization of Part 2 is parallel to that of Part 3. Readers who require information more detailed than that given in Part 2 should refer to corresponding discussions in Part 3.

A. THE WAR IN GENERAL

(U) Immediately after the disastrous Arab defeat in the 1967 war, the Soviet Union began a massive effort to rebuild the Egyptian and Syrian military forces, sending hundreds of advisors to instruct in the operation of the new equipment and to inculcate Soviet doctrine, tactics, and techniques in the Arab forces. Priority was given to Arab defenses against armor and aircraft, the two elements employed previously by the Israelis with such devastating effect.

(U) The Israelis, for their part, were disdainful of Arab fighting abilities and convinced that (1) the excellent Israeli intelligence system would provide warning of any future Arab attack, (2) the attacking enemy on either front would be sufficiently slowed by the Israeli defense lines composed of isolated strongpoints anchored to an obstacle system, so that (3) Israeli armor and air power, bolstered by rapid mobilization of well-trained reservists, could then destroy any enemy buildups either on the east bank of the Suez Canal (the Sinai) or in the Golan Heights.

(U) The coordinated Egyptian and Syrian attack against Israel on 6 October 1973 was minutely planned and rehearsed. The Egyptians had held numerous canal-crossing exercises, and special defensive works had been constructed along the west bank of the Canal. The large Egyptian standing army, already deployed well forward, was gradually strengthened; and for some 2 years President Sadat had been regularly issuing warnings that a renewal of the war was imminent. Similar preparations and deceptive actions had been taking place on the Syrian front.

(S) The Arab attack began on both fronts simultaneously, with an intensive artillery barrage lasting approximately 55 minutes, and with accompanying air strikes. The Israelis had begun emergency mobilization only at 0930 that morning. They expected the Arab

SECRET

SECRET

attacks at 1800 and were caught largely by surprise when the attacks were actually launched at 1400. During the artillery barrage on the Sinai front, five Egyptian infantry divisions began to cross the Canal and to build up a bridgehead on the east bank. Most of the few defenders of the 15 Israeli strongpoints were eventually either captured or killed, while Israeli tanks attempting to relieve the strongpoints suffered heavy losses to Egyptian antitank weapons fired from well prepared, protected, and concealed positions on both sides of the Canal. On the Syrian front, six infantry brigades supported by 240 tanks launched the initial attack in three main thrusts. Israeli strongpoints on the Golan Heights were bypassed in order to maintain the momentum of the attack, and were later to cause serious problems for the Syrians by serving as observation posts and by firing in the Syrian rear. In their attack, the Syrians used a total of some 1,400 tanks and 73,000 troops, while the Egyptian attacking forces totaled 1,500 to 1,600 tanks and over 120,000 troops. At the beginning of the October 1973 War, the Israeli army was outnumbered by about three to one in terms of active forces, but with mobilization it was later able to approximate the 350,000-man combined strength of the Syrian and Egyptian armies (the latter figure including Arab forces not actually participating in the attacks).

(S) The Israeli Air Force (IAF), which was already in a state of advanced readiness when the war began, had briefly contemplated a preemptive strike at Arab airfields and air defenses, but the Israeli government decided against this initiative for political reasons. The IAF was then forced to devote its primary attention to supporting the ground forces instead of achieving air superiority. Because of severe losses to Arab air defense weapons, however, the IAF had to adopt new tactics and concentrate on suppressing air defenses and attacking ground targets well separated from Israeli ground forces.

(U) Because of the proximity of the Golan Heights to the Israeli heartland, the Israelis concentrated their efforts on defeating the Syrian attack, meanwhile conducting a holding effort in the Sinai. After the first day, the Syrian attack slowed and then began to bog down in the face of the ferocious Israeli resistance. Israeli mobilization personnel and equipment were being committed to battle as rapidly as they reported for duty, and by 9 October they had begun to push the Syrians back on the southern part of the front. By 10 October the Syrians were back behind the 1967 cease-fire line, and by 12 October the attacking Israelis were far along the road to Damascus. After a total of 8 days of fighting, the Syrian front had become stabilized, and the Israelis turned their attention to the Sinai.

(S) Once the Egyptians secured their bridgeheads, they did not attempt further advances for about a week and made only small-scale probing attacks. On 13 October, two Egyptian armored divisions and a mechanized infantry division crossed the Canal and deployed on the east bank. Then on 14 October, in what appears to have been an effort to relieve the pressure on the Syrians, three Egyptian armored brigades attacked Israeli units between Ismailia and the Great Bitter Lake in a breakout attempt. The attacks were defeated, resulting in heavy Egyptian tank losses, chiefly due to Israeli superiority in tank-on-tank maneuvering and gunnery.

SECRET

SECRET

(U) On the night of 15 October, advance elements of an Israel Defense Forces (IDF) armored division drove between the Egyptian 2nd and 3rd Armies and reached the Canal, after which Israeli paratroops crossed in rubber rafts and began to raid surface-to-air missile sites on the west bank. In spite of heavy Egyptian artillery and concentrated armor attacks, resulting in the most massive tank battles of the war, the Israelis maintained their bridge-head. Two Israeli armored divisions crossed the Canal and began to destroy rear area service facilities and air defense units both to the northwest and the south. A third Israeli armored division crossed later, and by 21 October the Israelis had approximately 20,000 troops and 500 tanks on the west bank of the Canal.

(U) In the 2 days following the 22 October UN cease-fire, the Israelis continued their drive southward to the edge of the Great Bitter Lake. By the second cease-fire on 24 October, the Egyptian 3rd Army on the east bank was completely cut off from the remainder of the Egyptian forces.

(U) While all the really decisive action took place in the ground and air battles, there were several naval engagements between Israeli SAAR class guided missile boats equipped with the GABRIEL surface-to-surface missile and the Arab OSA/KOMAR class guided missile boats equipped with the STYX surface-to-surface missile. Also, Egypt established a blockade of the Bab el Mandeb Straits at the entrance to the Red Sea and engaged in mine warfare and submarine warfare. These actions did not pose serious problems to the Israelis during the October 1973 War.

B. THE GROUND WAR

1. Armor Forces

(S) At the outbreak of the October 1973 War, the Arabs had approximately twice as many tanks as the Israelis (Table 1).¹ However, the Arabs reportedly lost about 2.5 times as many tanks as the Israelis during the war. The factors that contributed to this outcome are discussed below.

Table 1 (S). Prewar Inventories of Armor

<i>Armor</i>	<i>Israel</i>	<i>Egypt</i>	<i>Syria</i>	<i>Arab:Israeli Ratio</i>
Tanks	2,119*	2,035	1,805	1.8:1
APCs	518	1,530	610	4.1:1
Halftracks	3,849	0	0	0:3,849

*Includes 136 captured Soviet tanks.

1. (U) More detail is given in Tables 7-9 (pp. 42-44).

SECRET

SECRET

a. Main Battle Tanks

(S) Over three-quarters of the prewar inventory of main battle tanks of Israel consisted of U.K. MK-13 Centurion tanks and U.S. Patton tanks.² Soviet T-54/55 and T-62 main battle tanks were found in similar percentages in the prewar inventories of Egypt and Syria.

(S) The Israelis prefer their U.S. and U.K. tanks to their Soviet tanks. Relative to the Soviet tanks, U.S. Patton tanks are superior in speed, agility, reliability, fire control, capacity of ammunition for the main gun, and space for crew operation. The Soviet tanks have a lower silhouette and are thus more difficult to hit.

(S) The Soviet T-62 was employed in combat for the first time in the October 1973 War. Initial results from joint U.S. and Israeli testing of the tank shows it to be an improved T-55. Its principal improvement is a 115 mm smoothbore gun that replaced the 100 mm rifled gun of the T-55. The U.S. Patton tank has a 105 mm rifled gun. On the basis of silhouette, armor, and lethality of armament, the T-62 would be expected to outduel the Patton tank.

(U) The pertinent U.S., U.K., and Soviet tanks are compared in Table 10 (p. 45).

b. Employment of Tanks

(S) The Israelis lost about 500 (25 percent) of their tanks, and the Arabs lost about 1,300 (over 30 percent) of theirs. Over 40 percent of the Israeli tanks, and about 45 percent of the Arab tanks, were lost or damaged during the war.³ It is estimated that Arab tanks and antitank guns caused about 70 to 90 percent of the Israeli losses and that Israeli tanks caused about 90 percent of the Arab losses.⁴

(S) A joint U.S.-Israeli Combat Vehicle Assessment Team (CVAT) examined 119 Israeli tanks and 435 Egyptian and Syrian tanks for causes of damage. Data in the CVAT report indicate that at least 75 percent of the impacts and 82 percent of the armor penetrations of Arab tanks resulted from Israeli tank fire. Armor-piercing main gun rounds were preferred by Israeli tankers and, given an impact, penetrated Arab tanks in greater percentages than other types of rounds.

(S) Israeli tankers did not have an antipersonnel round; they fired antimateriel rounds against infantry. According to the WSEG Armor Questionnaire, tank commanders indicated a preference for more machine gun ammunition and hand grenades. This suggests that they were constrained in combating dismounted personnel. The U.S. has a flechette round that gives the Patton tanks a much improved capability against infantry.

2. (U) These were M-60A1 tanks and M-48 tanks modified to the configuration of M-60 tanks. M-60 tanks have a different turret and commander's cupola than M-60A1 tanks.

3. (U) WSEG Report 225, *Preliminary Assessment of the Effectiveness of Weapon Systems Used by Opposing Forces in the October 1973 Middle East War*, Weapons Systems Evaluation Group, February 1974, TOP SECRET NOFORN/U.S. EYES ONLY.

4. (C) The Israelis had few other weapons suitable for engaging tanks. Infantry antitank weapons and aircraft effectiveness against tanks are discussed later (pp. 8 and 18).

SECRET

SECRET

Israeli Tactics. (S) Since the Israeli tanks were usually outnumbered, they engaged Arab tanks at extended ranges, employed ambushes on armor avenues of approach, fired from prepared defilade positions, and employed mobile defense doctrine to counter Arab armor penetrations. Over three-quarters of the targets engaged by Israeli tanks were tanks and APCs, although they also engaged infantry and antitank weapon positions.

(S) Over 40 percent of Israeli regular army tank commanders who responded to the IDF Armor Questionnaire stated that during their most intense day of combat they had 10 rounds or fewer remaining in their tanks after an engagement and before being resupplied. More than half of all tank commanders surveyed had fewer than 20 rounds remaining in their tanks under similar circumstances. Such low levels of ammunition supply must have limited firing in many of these cases. Over three-quarters of Israeli tanks have main gun ammunition capacities of over 60 rounds. The Israelis consider the greater capacity to be a clear advantage. They believe that main gun ammunition capacity should be at least 70 rounds and are designing a tank with this capacity.

Arab Tactics. (S) Arab armor, usually with some mechanized infantry support, attacked in column formations using standard Soviet battle doctrine with designated release points for battalions, companies, and platoons. Both Egyptian and Syrian armor attempted rigid textbook execution of this doctrine, apparently using guideline distances for the release points without adjustment for terrain or circumstance. Dismounting of mechanized infantry often occurred too soon and caused the pace of the entire assault to slow to the speed of the infantry. On the defensive, Egyptian armor made little effort to maneuver into flanking positions against Israeli forces, and they utilized terrain poorly.

(S) When under attack, Syrian armor often maneuvered to obtain flanking positions against Israeli forces. They positioned themselves in defensive blocking and ambush roles, hidden by the terrain. There were instances when the Israelis were taken by surprise by such tactics and suffered casualties. In general, Arab tank gunnery was reported to be poor in both accuracy and rate of fire relative to Israeli tank gunnery.

(S) On the Syrian front, it was reported that about 400 tanks were abandoned by Syrian crews during the war. This may have been caused by lack of fuel, lack of ammunition, personnel injuries, or fear.

c. Mechanized Infantry Vehicles

(S) The Israelis had over 500 U.S. M-113 armored personnel carriers (APCs). They liked the mobility, reliability, and overhead protection of the M-113. They indicate, however, that an APC should have greater fighting capability than this vehicle has. It carries only a 50 caliber machine gun, and the personnel being transported cannot fire without being exposed.⁵

5. (C) The Israelis found the M-113 to be quite useful for transporting ammunition to tanks. Trucks used for this purpose were frequently damaged by Arab artillery fire.

SECRET

SECRET

(S) The Arabs had several types of Soviet mechanized infantry vehicles, the most modern being the BTR-60PB and the BMP (only a few BMPs, perhaps fewer than a dozen, were observed). The BTR-60 is a wheeled vehicle that carries a turret-mounted 14.5 mm machine gun and a 7.62 mm machine gun. It has a crew of two and carries a 10-man infantry squad. The BMP is the most modern infantry vehicle in the Soviet inventory. It is a tracked vehicle weighing 14.9 tons with a low silhouette. It carries a 73 mm smoothbore gun, SAGGER antitank guided missiles, and a 7.62 mm coaxial machine gun. The 73 mm gun fires rocket-assisted warheads using an automatic loading system with a 40-round capacity. It has a crew of two and carries eight men in its troop compartment. Personnel carried in the BMP can fire their primary, individual weapons (AK-47 rifles) through ports without being exposed. The principal characteristics of the M-113, the BTR-60, and the BMP are given in Table 12 (p. 51).

(S) The Israelis report that the Arabs made little tactical use of their mechanized infantry vehicles, most Arab infantrymen operating dismounted.

2. Antitank Weapons

(U) In the first phase of the October 1973 War, the Israeli Army was tactically surprised by the appearance of large numbers of antitank weapons in the hands of Arab infantry. In particular, Israeli armor operating near the Suez Canal was reported to have suffered a large number of losses while attempting to contain the Egyptian bridgehead. The initial inventories of these antitank weapons are summarized in Table 2.⁶ These weapons and their employment are discussed below.

Table 2 (S). Prewar Inventories of Antitank Weapons

<i>Antitank Weapons</i>	<i>Israel</i>	<i>Egypt</i>	<i>Syria</i>	<i>Arab:Israeli Ratio</i>
RPG-7V	*	2,500	2,820	many:1
Other Unguided Antitank Weapons	322†	1,375‡	1,133‡	7.8:1
Antitank Guided Missile Launchers (Manpack and Vehicle-Mounted)	0	721	212	933:0

*An unknown number of captured Soviet RPG-7Vs.

†Recoilless rifles; quantity does not include unknown number of 3.5-inch rocket launchers.

‡Recoilless rifles and antitank guns.

6. (U) More detail is given in Tables 7-9 (pp. 42-44).

SECRET

SECRET**a. Characteristics of the Antitank Weapons**

(S) The principal weapon system used against tanks by Israel was the main battle tank. Other antitank weapons available to Israel during the war were the 3.5-inch rocket launcher, the 106 mm recoilless rifle, captured rocket-propelled grenades, and the U.S. LAW (Light Antitank Weapon). (The Israeli Army received the LAW during the final stages of the war, but data on employment are limited.) The U.S. TOW antitank missile system was furnished to the Israelis during the latter part of the war and was not employed in combat prior to the cease-fire.⁷

(S) In addition to the Soviet main battle tanks, the Arabs employed the RPG-7V (rocket-propelled grenade), the AT-3 SAGGER ATGM (antitank guided missile), the BRDM-2/SAGGER vehicle, and antitank recoilless rifles and guns.

(U) The characteristics of several antitank weapons are listed in Table 13 (p. 53).

(S) Based on their experience in using both the LAW and RPG-7V, the Israelis find the RPG-7V to be more rugged and easier to carry. They believe that the effective range of LAW (140 meters) is too short for desert operations. The RPG-7V has an effective range of about 300 meters and can be fitted with a night sight.⁸

25X1

Neither SAGGER nor TOW has a night sight, but SAGGER may be fired remotely. TOW is simpler to guide and more accurate than SAGGER. The TOW gunner keeps the crosshairs of his optical sight on the target during the flight of the missile; the SAGGER gunner must fly his missile to the target.

b. Interaction of Israeli Tanks With Arab Antitank Weapons

(S) Israel was well informed about the SAGGER missile and other Soviet antitank weapons and knew that the Russians were training the Arabs in their use. However, they were surprised by the quantity of antitank weapons employed. The Israelis estimate that 6,000 to 8,000 SAGGERS were fired by Arab infantry during the war.

(S) Israeli armor losses to infantry antitank weapons were significantly reduced after the first few days of the war. Suspected gunner locations were taken under fire to distract the antitank gunners, and the tanks attempted to maneuver to break line-of-sight or evade the missile. In addition, the arrival of mobilized reserve infantry and artillery forces created a better balance of Israeli ground forces. Artillery and infantry fire was then used to suppress the antitank fire. The validity of the combined arms team concept and the need for mutually supporting fires on the battlefield was reconfirmed.

(S) Reported estimates of SAGGER impacts on Israeli tanks vary between 1 and 25 percent of all impacts sustained. The only confirmed report of IDF tanks lost to SAGGERS is from the CVAT Report. Of 119 Israeli tanks examined, 11 were hit by SAGGER and

7. (U) The Israeli Ministry of Defense states that the French SS-11 was not used by the Israelis.

8. (U) The effective range of the RPG-7V is greatly degraded by crosswinds.

SECRET

SECRET

other antitank munitions (8 were hit by SAGGER only) and 18 were hit by antitank munitions of unknown type (possibly SAGGERS). Thus, the sample includes from 8 to 29 IDF tanks (from 6.7 to 24.3 percent) killed by SAGGERS. However, it has been reported that some 200 Israeli tanks were in Egyptian-held territory at the end of the war. Until these tanks can be examined, the actual toll of antitank guided missiles on Israeli tanks will not be known. Some of these tanks may have been lost to SAGGERS, to antitank guns and recoilless rifles, or to tanks.

3. Artillery

a. Effects of Initial Inventory on Artillery Employment

(S) After their 1967 defeat, the Arabs spent considerable effort upgrading their artillery. In the October 1973 War, they had about a two-to-one advantage over the Israelis in number of weapons and apparently had an even greater advantage in ammunition. Table 3 shows the initial inventories of weapons.⁹ The Arabs used mostly Soviet-supplied towed artillery. The Arab emphasis on artillery is in line with Soviet doctrine, which stresses the ability to deliver massive concentrations of artillery fire on key points.

Table 3 (S). Prewar Inventories of Artillery

<i>Artillery</i>	<i>Israel</i>	<i>Egypt</i>	<i>Syria</i>	<i>Arab:Israeli Ratio</i>
Heavy Mortars (>100 mm)	415	354	294	1.6:1
Guns and Howitzers	412	872	465	3.2:1
Multiple Rocket Launchers	*	72	20	92:few

*A small number of captured weapons.

(S) In contrast to the Arabs, the Israelis used armor and air power very successfully in the 1967 war. This experience led them to emphasize these arms at the expense of artillery and infantry. Then, in the October 1973 War, the Israeli Air Force found that it could not provide the close air support required, and Israeli artillery was forced to increase its direct support role. This unexpected burden led to a degradation of artillery performance due mainly to shortages of certain artillery pieces, projectiles, and fuzes as well as a lack of trained forward observers.

9. (U) Characteristics of U.S. and Soviet artillery used in the war are given in Table 15 (p. 58).

SECRET

SECRET

(U) With the exception of heavy mortars, most Israeli artillery was U.S. made. The U.S. 155 mm howitzers and 175 mm guns used by Israel (like the Israeli-made 105 mm howitzers) are self-propelled. This feature provides a definite advantage over towed weapons in mobility and in ability to quickly change azimuth. The 105 mm and 155 mm self-propelled howitzers also have overhead protection.

b. Effectiveness of Artillery Against Personnel and Armor

(S) About one-third of the Israeli casualties were caused by Arab artillery.¹⁰ Estimates of Arab casualties due to artillery are not available. Both the United States and the Soviet Union have artillery ordnance that is considerably more effective against personnel than those used in the October 1973 War, and artillery undoubtedly would have been more of a factor if this improved ordnance had been employed. Artillery, when available, was used effectively by the Israelis to suppress antitank fire from Arab infantry.

(S) Armored formations belonging to both sides frequently came under artillery fire. This artillery fire often degraded the ability of tanks to maneuver and acquire targets by both forcing tanks to button up (especially Arab tanks) and by creating dust and smoke. There is no evidence that a significant number of tanks were disabled by this fire.

c. Effectiveness of Counterbattery

(S) The Arabs had sufficient artillery resources to permit them to mount a formidable counterbattery effort. During the war, Arab artillery was mainly responsible for killing 194 Israeli artillery troops and wounding 980. Using a variety of acquisition methods, the Arabs often were able to deliver counterbattery fire within 20 minutes to an hour after the Israelis occupied a position. This caused the Israelis to change position frequently and discouraged them from registering their guns. This counterbattery fire gave the Israelis a great appreciation for the mobility and overhead protection of their U.S.-supplied M-109 155 mm self-propelled howitzers.

(S) Arab artillery generally did not have overhead protection and could be suppressed with a small amount of fire. Even so, the limited supply of ammunition and availability of weapons often prevented the Israelis from conducting effective counterbattery fire.

d. Effectiveness of Rockets

(S) While the Israelis employed a small number of rockets during the war, the Arabs employed the Soviet-made rocket launchers extensively. Rockets were useful in some situations requiring a high rate of fire, but they were not a major factor in the war. It appears that a few very successful attacks using large volumes of rockets and the resulting psychological effect created an exaggerated impression of this weapon's importance.

10. (U) WSEG Report 237, *Data From the October 1973 Middle East War, Volume III, "IDF Ground Forces,"* October/November 1974, SECRET NOFORN. The estimate is based on a survey of wounded personnel and, consequently, could be considerably in error.

SECRET

SECRET

4. **Night Vision Devices and Night Operations**

[REDACTED]

Fortunately for them, the skies were generally clear at night, with at least half-moon conditions prevailing during much of the war. This natural illumination, together with the employment of mortar and artillery illuminating rounds, did much to offset the Israeli materiel disadvantage.

(S) Arab ground forces were well equipped for night operations, but they did not utilize this advantage in terms of night attacks or continuous combat operations. The wide variety of Soviet-designed night vision equipment employed by the Arabs indicates that the USSR continues to emphasize night operations. However, the quality of most of the equipment used by the Arabs is inferior to the latest U.S. equipment.

5. **Physical Barriers**

(S) The Suez Canal and the Golan Heights were considered by the belligerents to be natural, defended barriers that would be costly in human and materiel resources to overcome. However, the Egyptian ground forces crossed the Suez Canal with only minor difficulty. Between 1400 on 6 October and dawn of 7 October, the Egyptians installed 10 bridges across the Canal and had 50 motorized ferries in operation. They were prepared to accept to up 30,000 casualties but suffered only 170 killed or wounded during the initial crossing.¹¹

(S) In contrast, the Israelis made a hasty crossing of the Suez Canal from the march. Israeli paratroops crossed the Canal in rubber boats before dawn on 16 October and attacked defending Egyptian positions from the rear. The first Israeli bridge, consisting of UNIFLOAT ferries, was installed that same day. Israeli units were brought under heavy, continuous artillery fire that lasted throughout the 4½ days of engineering operations associated with the crossing. The Israelis suffered 35 engineers killed and 150 wounded—as many as all initial casualties for the Egyptian crossing.

(S) In the Golan Heights, the Israelis had constructed a barrier consisting of an antitank ditch and minefields. The Syrians breached the barrier with only a slight delay by using Soviet bridging equipment and mine rollers (on T-55 tanks).

(U) The strategic surprise of the Arab attack prevented the Israelis from providing adequate surveillance and covering fire at the Canal and Golan Heights barriers. The ease of Egyptian and Syrian crossings reaffirms that barriers are not very effective without surveillance and covering fire.

6. **CBR Equipment**

(S) There are no indications that either side employed chemical-biological-radiological (CBR) weapons during the war.

[REDACTED] No U.S. toxic agents or munitions were provided.

11. (U) Hennessey Report, *DoD Military Team Visit to Egypt, 14-23 July 1974, Trip Report*, JCS 1887/813, 31 July 1974 (Rev. 14 August 1974), CONFIDENTIAL NOFORN.

SECRET

25X6

25X6

SECRET

(S) Both Egypt and Syria have a chemical force structure beginning with a chemical warfare directorate at the highest level and extending down to a chemical staff specialist at the company level. The presence of protective masks, clothing, and decontamination equipment gave the Arabs a capability to fight in contaminated areas and under aerial spray attack. In general, the Arabs were supplied with current Soviet equipment and prepared for operations in a CBR environment. The quantity and quality of this equipment supports the continuing Soviet emphasis on

25X1

7. Electronic Warfare in the Ground War

(S) The Egyptians apparently learned an important lesson about communications from the 1967 Six-Day War. In the October 1973 War, they made such massive use of communications jamming and interception that the Israelis had to minimize communications emissions and establish countermeasures. The Egyptians used active jamming and imitative communications deception, and they used direction-finding equipment to locate Israeli emitters so they could be targeted. Not only did the Egyptians exploit Israeli errors in communications security, but they used landlines extensively to minimize their vulnerability to Israeli exploitation. The Israelis did make an effort to jam Arab communications and exploit intercepted signals, but they were not nearly as successful as they had been during the 1967 war.

8. Ground-Based Air Defense

(C) The October 1973 War marked a milestone in the evolution of ground-based air defense systems. For the first time, a highly skilled air force with modern aircraft was prevented from providing effective close support to their ground forces by their adversary's ground-based air defense.

(C) The Arab ground-based air defense was technologically the most advanced ever used. It was also numerically superior to the Israeli ground-based air defense force (Table 4). The Arabs employed many Soviet antiaircraft gun systems, including the modern Soviet ZSU-23-4—a four-gun, radar-directed, fully tracked antiaircraft weapon. The Arabs also employed many Soviet SA-7 shoulder-fired infrared homing missiles.¹² Finally, the Arabs used the SA-2, SA-3, and the modern Soviet SA-6 surface-to-air missiles. The Arabs had far more SA-2s and SA-3s than SA-6s, and they had far more old guns than ZSU-23-4s.

(S) The Arab ground-based air defense is credited with 75 of the 102 Israeli aircraft losses. Missiles are thought to have killed a few more aircraft than guns.¹³ The defense was so intense on both fronts that the Israelis practically abandoned the close support mission after the first few days of the war. Their ground forces then had to rely on the sparse resources of the artillery. The implications of the situation for air warfare will be discussed in the following section.

12. (C) Some estimates are in the thousands.

13. (U) See Table 17 (p. 79).

SECRET

SECRET*Table 4 (S). Prewar Inventories of Ground-Based Air Defense Weapons*

<i>Ground-Based Air Defense Weapons</i>	<i>Israel</i>	<i>Egypt</i>	<i>Syria</i>	<i>Arab:Israeli Ratio</i>
Antiaircraft Gun Systems	819	1,612	694	2.8:1
Surface-to-Air Missile Launchers				
Shoulder-Fired	0	366*	120*	486:0
HAWK (Israel), SA-6 (Arab)	72	40	60	1.4:1
Other Crew-Served	0	800†	90†	890:0

*Soviet SA-7 missile launchers.

†Soviet SA-2 and SA-3 missile launchers.

(S) The Arab ground-based air defense, while very intense, apparently had a low effectiveness per missile. From Israeli-supplied estimates, there were about 50 to 70 SA-2s, -3s, and -6s fired per aircraft destroyed. Of course, many of these must have been SA-2s and -3s, for which the Israelis had effective electronic countermeasures.

(C) The Israelis had 20 mm and 40 mm antiaircraft gun systems. The 20 mm systems, with twin guns and a crude sight, were mounted on halftrack vehicles. U.S. VULCAN 20 mm antiaircraft guns were supplied to Israel during the war but were never used. The Israelis did not have the U.S. REDEYE (similar to the Soviet SA-7), but they had HAWK surface-to-air missile systems.

(C) The U.S. HAWK and Soviet SA-6 use the same guidance technique—semiactive radar homing—and they have about the same altitude capabilities. The HAWK has nearly twice the maximum range of the SA-6, but the SA-6 is more mobile (being fully deployed on tracked vehicles) and can displace and set up considerably faster than the HAWK. The United States has no weapon equivalent to the ZSU-23-4.

(S) The Israeli ground-based air defense, like practically all elements of the Israeli forces, achieved a better kill rate than their Arab counterparts. About 100 of the 500 Arab aircraft losses are credited to Israeli guns and surface-to-air missiles. The Israelis relied primarily on their fighter-interceptor aircraft for air defense, and the HAWKs were seldom used if aircraft were available. Through October 29, 63 HAWKs were fired in only 32 engagements and destroyed 22 Arab aircraft. The other 78 Arab losses are credited to a variety of guns, including 42 kills by the 20 mm halftracks.

(C) On balance, then, the Arabs achieved a notable success by preventing Israeli close air support, but in terms of aircraft destroyed, the Israelis achieved more with a smaller force.

SECRET

SECRET**C. THE AIR WAR**

(U) Israel has considered the Israeli Air Force (IAF) to be one of the two principal elements of the Israel Defense Forces (IDF). In the 1967 Six-Day War, air power and armor had been decisive, and in the period 1967-73, Israel continued to place its trust primarily in these elements. The superior performance of Israeli armor was described in the preceding section on the ground war. In the present section, the performance of the IAF will be described and compared with that of the Arab air forces. The inventories of aircraft and ordnance are presented first, followed by discussion of a series of important issues of the air war. A more detailed treatment is given in Chapter III of Part 3.

1. Inventories of Israeli and Arab Combat Aircraft

(S) Table 5 presents estimates of the Israeli and Arab combat aircraft inventories at the start of the October 1973 War.¹⁴ The bulk of the Israeli force consisted of [redacted] The Arab force was also dominated by two types—the MIG-21 FISHBED and MIG-17 FRESCO (53 and 26 percent, respectively).

25X1
25X1*Table 5 (S). Prewar Inventories of Combat Aircraft*

<i>Aircraft</i>	<i>Israel</i>	<i>Egypt*</i>	<i>Syria*</i>	<i>Arab:Israeli Ratio</i>
Fighter-Bombers and Interceptors	354	472	229	2:1
Bombers	0	26	0	26:0

*Arab aircraft include 32 aircraft placed at their disposal by other countries.

(S) Although the Israelis were outnumbered two to one by the combined Arab forces, they performed several times as many combat sorties as the Arabs and lost only one-fifth as many aircraft. In addition, an average Israeli sortie carried two to three times as much ordnance as an average Arab sortie.

(S) Late in the war, the United States supplied Israel with an [redacted] [redacted]¹⁵ The Soviet Union also supplied the Arabs with combat aircraft during the war, although data on exact quantities and types are not available.

25X1
25X1

14. (U) Also see Table 16 (p. 76).

15. (S) Through October 21, only 36 aircraft had been supplied.

SECRET

SECRET

(S) While substantial quantities of combat aircraft were supplied to each side during the war, it does not appear that availability of aircraft limited the daily sortie rate of the respective Israeli and Arab forces. One exception may have occurred on 22 October, when the Israelis achieved a peak of almost 800 sorties. This required that a high percentage of their aircraft be operationally available on that day.

2. Inventories of Israeli and Arab Ordnance

(S) Prewar stockage of U.S.-supplied ordnance to Israel consisted of 83 percent general-purpose (GP) bombs and 12 percent cluster bombs by weight. The remaining 5 percent comprised rockets (4 percent), guided bombs, gun ammunition, air-to-air missiles, and air-to-ground missiles in decreasing order by weight. Actual wartime expenditures, however, consisted of 66 percent GP bombs and 32 percent cluster bombs, with the remaining 2 percent comprising rockets, guided bombs, air-to-ground missiles, air-to-air missiles, and gun ammunition.¹⁶

(S) The most significant aspect of the above data is the Israeli emphasis on cluster bombs during the war. In fact, the United States supplied additional cluster bombs during the war, and the Israelis expended one-third more than were in their inventory at the beginning of the war. In contrast, only one-half of the prewar inventory of GP bombs was expended by the end of the war.

(S) This sizable change between planned and actual expenditures is believed to be due largely to the significantly more intense ground-based air defense environment encountered in 1973 than in 1967. The intense defensive environment caused Israeli aircrews to switch from the close-in, pinpoint dive bombing techniques used in the 1967 war to pop-up and lofting techniques to minimize exposure to defenses. Cluster bombs were chosen apparently to partially compensate for reduced delivery accuracies. This probably implies a reduced effectiveness in the 1973 war. The use of air-to-ground rockets and gun ammunition was also far less than the planned use as indicated by stock levels. This, too, probably resulted from the intense air defense.

(S) While no data are available regarding Arab ordnance inventories, it is known that they used 500- and 1,100-pound bombs of GP, cluster, and fragmentation varieties. Extensive use was made of unguided air-to-ground rockets comparable to the U.S. 2.75- and 5-inch rockets. In addition, at least 26 air-to-ground KELT cruise missiles were used, as well as unknown quantities of ATOLL air-to-air missiles and 23 mm and 30 mm gun ammunition. There is no evidence that the Arabs used or had access to guided weapons comparable to the U.S. HOBOT, MAVERICK, or WALLEYE, which were supplied to Israel.¹⁷

16. (U) The data are listed in Table 19 (p. 81).

17. (U) These guided weapons are discussed in Subsection 5 (p. 19).

SECRET

SECRET**3. Close Air Support**

(S) The IAF flew 7,272 strike sorties (65 percent of the total), with the remaining effort devoted to air defense. The portion of these strike sorties used for close air support is not known.¹⁸ However, it is estimated that 90 percent or more were preplanned strikes at least 5 km inside enemy territory, so close air support must have constituted a small percentage of the strikes.

(S) The Arabs flew about 1,000 strike sorties,¹⁹ however, the number flown in close air support, if any, was small. The Israelis have stated that Arab air attacks had little effect on IDF ground forces other than to cause some soldiers to fire indiscriminately at all aircraft, including their own.

(U) The Israeli concept of close air support is very similar to that of U.S. forces. It is based on centralized control of air forces and depends on verbal radio contact between an aircraft controller and the strike aircraft. In the IDF, the controller is an artillery forward observer (FO) on the ground, while in the U.S. forces he is an Air Force forward air controller (FAC) usually in the air but sometimes on the ground. The concept employed by the Arabs is not known.

(S) The IDF concept of operation failed to provide effective close air support. The principal reason for this failure was the intense enemy anti-aircraft defenses encountered from surface-to-air missiles and anti-aircraft guns. These defenses were so lethal that strike aircraft could not stay in the target area long enough to coordinate with FOs, acquire their targets, and deliver their ordnance. The defenses forced adoption of low-level ingress and egress tactics utilizing preplanned initial points for pop-up to acquire targets and single passes for weapon delivery. With this tactic, it was not possible to provide the strike pilot with detailed targeting information and control in proximity to friendly forces. In the last few days of the war, when the Arab anti-aircraft defenses had been suppressed, the IAF was able to provide effective close air support.

(S) After the war, the IDF conducted an inquiry into close air support. Most of the deficiencies they noted would have been relatively minor were it not for the effective Arab air defense. These difficulties also would largely apply to U.S. and NATO forces facing Warsaw Pact forces and in some cases would be made worse by the poorer European weather and the increased clutter. Among the more important difficulties listed by the IDF are:

- (1) *Target identification and marking.* Target acquisition was complicated by the low-altitude tactics dictated by enemy defenses. Artillery marking rounds were difficult to see and to differentiate from other explosions in the battle area.
- (2) *Identification and marking of friendly forces.* Colored smoke and panels used by ground forces were not clear enough and were imitated by the Arabs.

18. (U) *Close air support* consists of air attacks against hostile targets that are in proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces.

19. (U) *This is an Israeli estimate.*

SECRET

SECRET

Reliance on aircraft recognition training of ground troops and distinctive aircraft markings proved inadequate.

- (3) *Radio communications.* Israeli communications were confused by many identification signals. Arab communications jamming complicated air-to-air contact as well as communications with the ground.
- (4) *Night attack.* The use of flares by the IAF for close air support at night was considered inadequate.

(C) This Israeli experience contains an important lesson for U.S. and NATO forces. It seems clear that the U.S. use of an airborne FAC, especially one in a low-performance aircraft, will not be generally successful if the Warsaw Pact air defenses are not suppressed. Control from the ground with present techniques is not likely to be effective. Furthermore, use of multiple passes for delivery of nonstandoff ordnance will not be generally acceptable. This points up the need for better systems to locate and destroy air defenses or for systems to permit close air support from standoff ranges.²⁰

4. Employment of Air Power Against Armor

(S) No conclusive evidence has been found that the IAF was successful in killing a significant number of Arab tanks in the environment of the intense air defense of the October 1973 War. In areas away from the Arab air defense, however, the IAF reported that 103 hits were scored on Arab tanks and other vehicles by guided weapons (WALLEYE, HOBO, and MAVERICK).²¹ These electro-optical (EO) weapons are discussed further in the next subsection.

(S) Of the 435 killed Arab tanks that were examined by the Israeli Combat Vehicle Assessment Team (CVAT),²² only 3 showed evidence of hits delivered from the air, and 2 of these were scored by ROCKEYE antiarmor bomblets. However, the tanks accessible to the CVAT were all in Israeli-controlled territory; none were taken from areas where guided weapons were employed by the IAF.

(S) Two different situations in which Arab tanks stopped or turned back were investigated to determine whether the IAF played a direct role. The first of these situations occurred in the Golan Heights, where Syrian tanks broke through in the central and southern sectors. The Syrian advance in these sectors came to a halt with little apparent resistance from Israeli ground forces. There have been verbal statements that Syrian tanks were killed from the air in this region. However, this claim cannot be confirmed either by formal reports or by the CVAT's examination of killed tanks. It is possible that the advance

20. (C) Several technological developments are underway to improve the U.S. capability for close air support. Most notable is the ground-based laser target designator, which can be used in conjunction with a laser detector in the aircraft or in a standoff weapon. Coded laser signals can ensure positive identification of the target.

21. (U) WSEG Report 237, op. cit., Volume IV, "Air Operations."

22. (U) WSEG Report 237, op. cit., Volume VII, "Combat Vehicle Assessment Report."

SECRET

SECRET

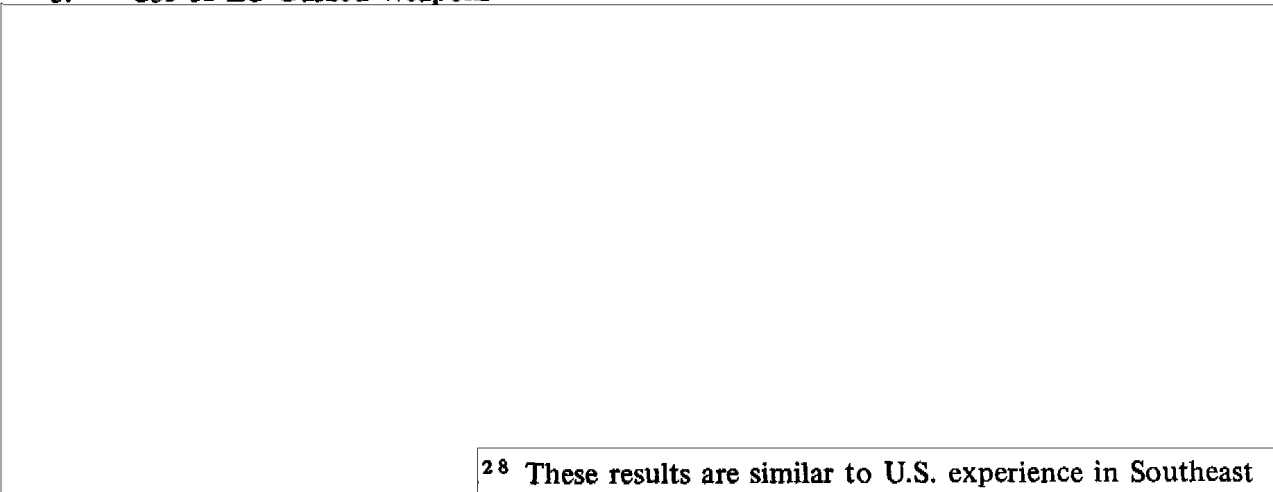
of the Syrian tanks came to a halt because of supply shortages or for tactical reasons. It is also possible that Israeli air power had an effect.

(S) In the second action, the IAF is credited with stopping, and largely destroying, a number of tanks and support vehicles on the western edge of the Sinai Peninsula in the vicinity of Ras Masala.²³ There was no effective Arab air defense in that area, and the IAF reported strikes on armor in that area at the approximate time of this action.²⁴ At this same time (October 12), the IAF began using WALLEYE—an EO guided bomb known to be effective against tanks.²⁵ It is possible, then, that this tank expedition was stopped and substantially destroyed by air power.

(S) On the basis of available data, it is concluded that:

- (1) The IAF attacked Arab armor with unguided bombs in the presence of air defenses. There is no quantitative evidence that these attacks destroyed a significant number of tanks, but they may have affected accompanying forces.
- (2) EO guided bombs scored hits on tanks and other vehicles; however, these hits were scored in an environment of little or no air defense.
- (3) The October 1973 War neither confirms nor contradicts that air, given proper ordnance but operating in the air defense environments anticipated in future conventional wars, can be effective directly against armor.

5. Use of EO Guided Weapons



25X1
25X4

²⁸ These results are similar to U.S. experience in Southeast

23. (U) Letter, R. Melamed, Lt. Col. IAF, to B. F. Williams, Col. USA (WSEG), 17 May 1974

24. (U) WSEG Report 237, op. cit., Volume IV, "Air Operations."

25. (U) Ibid.

26. (S) The Israelis did not have laser guided weapons.

27. (U) WSEG Report 237, op. cit., Volume IV, "Air Operations."

28. (U) Ibid.

SECRET

SECRET

Asia, though on different kinds of targets. In Southeast Asia, 60 percent of the EO guided weapons were used against bridges.²⁹

(S) Since the EO guided weapons were used predominately in areas where the air defense was light, multiple passes were used to achieve lock-on and weapon delivery. Standoff ranges at release were considerably below the aerodynamic or ballistic range capabilities of the weapons, but were similar to those used by the United States in Southeast Asia.

(S) The Arabs used no EO guided weapons.

6. Attack of Aircraft on the Ground

(S) On the first day of the 1967 Six-Day War, the Arab air forces suffered a disastrous defeat, when 370 of their aircraft were destroyed on the ground. To avoid a repetition of this, the Arabs made a concerted effort to disperse and protect their aircraft. The Israelis, despite devoting approximately the same level of effort as in 1967 (and this with more capable aircraft), claim to have destroyed only 22 aircraft on the ground.³⁰ This striking difference in results is attributed to the construction of enough covered aircraft shelters to protect all of the Egyptian and Syrian tactical aircraft and to the defense of Arab airfields by surface-to-air missiles and antiaircraft guns. Post-war tests against captured Arab shelters confirm their relative invulnerability to attack with present conventional munitions.

(S) The important lessons from this experience are simple:

- (1) Aircraft shelters on defended airfields are very effective in reducing the vulnerability to air attack of aircraft on the ground. This capability should be fully exploited for friendly air forces.³¹
- (2) The destruction of enemy aircraft in shelters at defended airfields with present conventional munitions and delivery systems is not a good application of air power.

7. Air-to-Air Combat

(S) The IAF achieved an overwhelming victory over Arab forces in the air-to-air battles of the October 1973 War. Employing the U.S. F-4E and the French MIRAGE IIIC armed with U.S. and Israeli-built air-to-air missiles, the Israelis achieved an exchange ratio of over 40 to 1.³² By its superiority in the air, the IAF prevented the Arabs from mounting an effective air-to-ground campaign.

29. (U) WSEG Report 236, *Evaluation of Guided Bomb Systems Employed in Southeast Asia*, May 1974, SECRET.

30. (S) These 22 aircraft were probably not in shelters, although this is not known. The Israelis lost seven aircraft on missions to attack airfields.

31. (U) The Arab aircraft shelters are much harder than U.S. and Allied shelters in Europe.

32. (S) Estimates range as high as 110 to 1. Loss data provided by Israel lead to a loss ratio of 80:1.

SECRET

SECRET

(S) Based on comparison of the overall capabilities of the F-4E and the Soviet FISHBED-J (MIG-21), including their respective weapons and based on equal pilot skills, an exchange ratio of 3 to 1 in favor of the F-4s would be expected.³³ However, Israeli-manned F-4s achieved an actual exchange ratio of approximately 20 to 1 over Arab-flown aircraft. This high exchange ratio is credited, for the most part, to the superiority of Israeli pilots over Arab pilots. This superior skill can be attributed in part to Israel's excellent aircrew selection and training programs.

8. Aircrew Training

(S) Information on the Egyptian and Israeli training programs permits a comparison based on flying hours and sorties, if not on quality of instruction. The Egyptian and Israeli aircrew training programs, prior to advanced training, are approximately equal in total numbers of sorties scheduled. Both the Israelis and the Egyptians have high washout rates in primary and basic training—75 percent for the Israelis and 50 percent for the Egyptians. However, the Israeli advanced training and continuation (operational unit) training are more thorough and demanding than the Egyptian programs. Prior to the October 1973 War, the Israeli aircrews assigned to operational squadrons flew more than twice as many sorties annually as the Egyptian aircrews.

(U) An attempt to draw conclusions on the relative capabilities of U.S. and Soviet pilots based on information gathered in the October 1973 War was not successful. Egyptian aircrew training was based to a large extent on Soviet techniques; Israeli training, in some instances, uses modified U.S. training manuals. However, there are too many differences in scenario, training, and motivation to draw any meaningful conclusions.

9. Aerial Reconnaissance

(S) Israeli reconnaissance platforms consisted of [redacted] and 2 French MIRAGE IIICs. [redacted]

[redacted] The Arabs were equipped with 10 Soviet FISHBED Hs and 6 reconnaissance versions of the Soviet FITTER, as well as 2 MIRAGE IIIRs furnished by Libya. (The USSR used reconnaissance satellites and FOXBAT aircraft.)

(S) While results are not available for analysis, it has been generally recognized that the aerial reconnaissance performed was inadequate for tactical strike planning. Lack of timeliness has been and continues to be the single greatest limitation to the application of aerial reconnaissance to tactical strike planning. Response times ranged from several hours to half a day. The intense air defense also caused serious degradation in the quality of results due to the high altitude or long standoff range restrictions it placed on reconnaissance platforms. The principal value of reconnaissance appears to have been for strategic planning and damage assessment of fixed installations.³⁴

33. (U) See Part 3 (p. 92).

34. (S) The Israeli experience reemphasizes the need for a real-time reconnaissance system to allow for rapid acquisition of mobile targets. One promising approach would be to use a small, remotely piloted vehicle with regular or low-light-level TV and a radio data link to transmit images immediately to the ground. Another useful capability could be provided by long-range, side-looking, high-resolution sensors to improve reconnaissance imagery while at the same time enabling aircraft and drones to avoid intense air defense environments.

SECRET

SECRET**10. Electronic Warfare in the Air War**

(S) The electronic warfare aspects of the air war were dominated by the Israeli use of electronic countermeasures (ECM) in support of tactical air operations in penetrating and surviving the Arab air defenses. Most of the Israeli electronic warfare equipment was supplied by the United States, and the Israeli electronic warfare tactics reflected recent U.S. experience in Southeast Asia. Arab air defenses, on the other hand, were supported by the Soviet Union. This conflict was the first in which U.S. equipment encountered a sophisticated air defense that included the ZSU-23-4 antiaircraft gun and SA-3/SA-6 surface-to-air missile systems.

(S) A variety of both active and passive measures was employed by the Israelis. Extensive use was made of active jamming by (1) ECM pods carried onboard penetrating aircraft for self-protection and (2) support jamming provided largely by helicopters in a standoff role, but also by ground-based jammers. Passive electronic warfare measures included use of chaff and radar-warning receivers.

(S) At the beginning of the war, the IAF had three types of U.S. ECM pods; a fourth, and modern, pod was provided during the last days of the war.³⁵ However, it is important to note that there was no effective onboard jamming protection available against the highly mobile SA-6 and ZSU-23-4.

(S) Support jamming equipment was carried principally by CH-53 helicopters.³⁶ This equipment could counter the target tracking radars associated with the SA-2B/F, SA-2C/E, and the SA-3, and both the target tracking and acquisition radars associated with the SA-6.

(S) Chaff was extensively employed by the Israelis against all Arab air defense units, including the SA-6. It was frequently employed in self-protection just prior to weapon delivery maneuvers. Chaff bombs, artillery rounds, and rockets were used for general strike support.

(S) Because of the preventive nature of ECM, it is not possible to establish quantitatively its effect on aircraft attrition. The Israelis believe that electronic warfare employed against Arab air defenses generally increased the survivability of their aircraft. This assessment is based on Israeli pilot reports, POW interrogation reports, and intelligence reports. Reports from captured SA-2 and SA-3 site commanders confirmed that the effectiveness of their systems was degraded by the Israeli use of electronic warfare.

D. THE SEA WAR

(U) During the October 1973 War, the Israeli, Egyptian, and Syrian navies conducted a sea war that involved numerous types of operations. These operations apparently had little influence on the ground war, and the principal boats and weapons involved were not U.S. made.

35. (U) See Part 3 (p. 97) for types.

36. (S) A limited number of TA-4s were also used in this role.

SECRET

SECRET**1. Inventories of Boats and Ships**

(C) The main weapon system used by the Israeli Navy during the war was the small, high-speed SAAR class missile boat armed with the Israeli-built GABRIEL surface-to-surface missile. The weapon systems used by the Arab navies in both the Mediterranean and Red Seas were the smaller, high-speed OSA and KOMAR class missile boats armed with the Soviet STYX surface-to-surface missile. Egyptian submarines were also active in the Mediterranean and Red Seas. Two Egyptian destroyers and a frigate were involved in a blockade of the Bab el Mandeb Straits. Table 6 lists the initial inventories of the three combatants.

Table 6 (S). Prewar Inventories of Boats and Ships

<i>Boats and Ships</i>	<i>Israel</i>	<i>Egypt</i>	<i>Syria</i>	<i>Arab: Israeli Ratio</i>
Missile Boats	14	17	9	1.9:1
SWIFT Boats	18	0	0	0:18
Small Craft	10	24	2	2.6:1
Torpedo Boats	0	34	13	47:0
Destroyers	0	5	0	5:0
Frigates	0	3	0	3:0
Submarines	2	12	0	6:1

2. Missile Boat Engagements

(S) There were four missile boat engagements in which both the GABRIEL and STYX were fired. Two of these engagements occurred in the open sea, and the other two were fought near the entrances of Syrian harbors. GABRIELs sank or damaged five Arab craft during the first two of these engagements. In the other two engagements, three neutral merchant ships anchored in Syrian harbors were hit by GABRIELs attacking nearby Arab craft. There were no Israeli losses in the entire war.

(S) All missile boat actions took place at night in Egyptian and Syrian waters. Environmental conditions during the conflict were good—clear weather, calm seas, and more than quarter moon. Radar ducting produced relatively long detection ranges of surface targets.

(S) The GABRIEL has a range of 11 miles—about half that of the STYX. This disadvantage was completely overcome by the Israelis through carefully planned tactics that included the judicious use of electronic warfare. The tactics employed by the two sides were roughly as follows:

(S) The Arabs detected the SAARs by radar, fired one or two missiles at each target, and disengaged. The Arabs did not minimize electronic emissions and did not employ

SECRET

SECRET

electronic countermeasures. The Israelis usually detected the Arab electronic emissions and from these were able to locate the Arab boats with little use of their own radar. After locating the Arab boats, the Israelis deployed decoy chaff and raced full speed toward those targets. If a STYX missile appeared to guide on an Israeli boat, self-defense chaff was deployed, electronic jammers were activated, and the boat's guns were used to engage the STYX. GABRIELs were then fired at the Arab craft when they came within range.

(S) The Israeli tactics were so successful that no SAAR boat was hit, though some 50 STYXs were fired. In contrast, a like number of GABRIELs scored 11 hits against Arab craft (and 6 hits on 3 neutral merchant ships).

(S) It is clear that the success of the Israelis in these engagements was due to the tactics employed by the two sides. The possibility that the Arabs will change their tactics and introduce electronic countermeasures in a future conflict is a serious concern to the Israeli Navy.

3. Shore Bombardment

(S) Egyptian forces conducted several shore bombardment missions against Israeli-controlled territory. Early in the conflict, 122 mm rockets were fired from Egyptian torpedo boats against Israeli positions near Port Said in the Sinai. The remainder of the attacks occurred in the Gulf of Suez and against the Sharm el Sheikh area. In the attacks on Sharm el Sheikh, the Egyptians used both rockets and STYX missiles. No damage was reported in any of these attacks. Syrian forces conducted no shore bombardment against Israel.

(S) Numerous attacks were conducted by Israeli SAARs against Egyptian and Syrian coastal installations in the Mediterranean. Principal targets included oil storage tanks and military installations. On many occasions, the SAARs encountered heavy shore fire from 130 mm radar-directed guns. These guns were considered highly accurate by the Israelis. However, the SAARs were effective in countering shore gunfire by maneuvering and using short-range chaff.

(S) The primary weapon used by the Israeli Navy for shore bombardment was the 76 mm OTO MELARA gun. The Israelis were generally pleased with the gun in this role, but it was rather unreliable, with a mean-rounds-between-stoppages of only 43. An OTO MELARA scheduled for U.S. manufacture has a specification of 600 rounds between stoppages.

4. Commando Operations

(S) Israeli Navy Sea Force Commandos conducted five clandestine operations. Four raids were conducted against Egyptian ports in the Gulf of Suez; the fifth was conducted against Port Said. All operations were of short duration (less than 24 hours), with no resupply required. None of the operations were planned prior to commencement of hostilities, but were tailored to achieve specific objectives during the war.

SECRET

SECRET

(S) The results of the Sea Force Commando operations can be summarized as follows:

- (1) Two KOMARs were damaged—one by limpet mines and the other by LAWs (Light Antitank Weapons).
- (2) One OSA, one landing craft, and one P-6 patrol boat were damaged by limpet mines. Two of the four Israeli commandos in the raiding party were killed.

(S) Arab commandos reportedly conducted three attacks on Israeli coastal installations. Damage was reported as insignificant.

5. Mining Operations

(S) Only Egypt engaged in mining operations. Syria has Russian-built mines in its inventory and had a minelaying capability. Israel had no minelaying capability.

(C) The existence of an Egyptian-laid minefield did not become known until after the war, when two incidents involving mines occurred in the Gulf of Suez. An Israeli-operated Liberian-flag tanker, the 42,000-ton *Sirius*, was severely damaged by a mine; the *Sirius* drifted onto a reef and eventually sank. Later another tanker, the 2,000-ton *Cyrenia*, was slightly damaged by a mine.

(S) The presence of a minefield extending from the entrance of the Strait of Jubal to the vicinity of At-Tur has since been confirmed. It is not known when the field was laid. The Israeli Navy claims that the area was used by naval craft throughout the war without a mining incident.

6. Submarine and Antisubmarine Warfare

(S) Only the Egyptians used submarines.³⁷ Of the 12 submarines in the Egyptian Navy, 10 were in the Mediterranean Sea and two were in the Red Sea.

(S) Three incidents involving submarine operations were reported. Three torpedoes were fired at the Israeli-operated Liberian-flag merchant vessel *Samson* in the Red Sea; all missed. Egyptian submarines attempted to intercept the Israeli ship *Hanna*, west and south of Cyprus; the effort failed. A Greek merchant ship, sailing from Alexandria to Bengazi, Libya, received two torpedo hits and sank about 60 miles north of Alexandria. It is presumed that an Egyptian submarine made this attack.

(S) No antisubmarine warfare (ASW) operations were conducted by either side. Israeli ASW capability is very limited; only six SAARs are equipped with a sonar. Because of this, Egyptian submarines could have posed a serious threat to Israeli-bound shipping if they had been utilized effectively.

7. Naval Blockade

(S) At the commencement of hostilities, Egypt undertook a naval blockade of the Bab el Mandeb Straits in the Red Sea. Although this blockade was continued after the war

37. (U) Israel has two training submarines, but they were not used in the war.

SECRET

Page Denied

SECRET

artillery, aircraft, air defenses, and boats—the Arabs had an advantage that was usually greater than two to one.

(S) Losses among all combatants were very high during this short (19-day) war. The Israelis lost 25 percent of their tanks and 30 percent of their fighter aircraft. The Arabs lost over 30 percent of their tanks and over 50 percent of their fighter aircraft.

(S) Expenditures of ordnance were also very high. The Israelis expended two-thirds of their prewar inventory of the 105 mm APDS (Armor-Piercing Discarding-Sabot) round—their most effective round for tank fire against tanks. They fired 80 percent of their initial supply of 105 mm artillery rounds, 110 percent of their 155 mm high explosive (HE) rounds, and 120 percent of their 175 mm HE rounds. The Arabs fired far more artillery rounds than the Israelis did, but the quantity is not known. The Israelis also expended nearly half of their general-purpose (GP) bombs and 130 percent of their initial supply of cluster bombs.

(S) The U.S. wartime resupply to Israel was of critical importance in several areas. In particular, the artillery rounds were necessary in order for their artillery to keep functioning; the tank APDS rounds were helpful in that tankers could freely use their most effective round; and the cluster bombs were apparently considered important in that the IAF could perform battlefield interdiction using maneuvers that minimize aircraft losses.

(S) The wartime resupply of tanks was insignificant (only 4), and the wartime resupply of fighter aircraft was apparently of small consequence (only 36 had arrived by 21 October). The arrival (and anticipated arrival) of aircraft may have permitted the Israelis a freer hand in the use of their air force.

(S) Examination of losses and expenditures during the October 1973 War shows that the Israelis fought the war differently than they had planned. They used far more artillery than planned, and they used a different mix of air-to-ground ordnance than planned. The increased use of artillery resulted from the need to suppress Arab antitank weapons and from the inability of the IAF to provide effective close air support. The different mix of air-to-ground ordnance resulted from the effective Arab ground-based air defense, which rendered the usual maneuvers for delivery of GP bombs, air-to-ground rockets, and air-to-ground gunfire unacceptable because of high aircraft losses.

(U) The only explanation that has been found for the superior performance of the Israeli forces is that their soldiers, airmen, and sailors performed much better than their Arab counterparts. If it is correct that personnel skills, planning, and motivation can overcome two-to-one or three-to-one odds, the United States and NATO should make every effort to ensure that their personnel are as well prepared as the Israelis were. The numerical odds in Europe could easily be about three to one in favor of the Warsaw Pact forces.

(U) The October 1973 War does not provide a clear insight to a possible war in Europe. There was heavy Soviet influence on Arab doctrine and tactics; on the other hand, there were also numerous examples of Arab planning and Arab failure to use Soviet equipment to best advantage. Furthermore, the Israeli doctrine and tactics do not duplicate those of the United States, and their force structure is not a microcosm of the U.S. structure.

SECRET

SECRET

(S) Nevertheless, there are several extremely important lessons that have been learned from or reaffirmed by the October 1973 War:

- (1) Infantry antitank weapons, particularly the guided missiles, are an effective element in defense against tanks. Such weapons may have caused 10 to 30 percent of the Israeli tank losses.
- (2) Artillery is needed to suppress antitank gunners and to reduce the effectiveness of tank maneuver and tank fire.
- (3) Armor is still a formidable component of the combined arms team. Because of its firepower, hardness, and maneuverability, the tank was the principal offensive weapon used by both sides.³⁸
- (4) A modern ground-based air defense can force a well-equipped modern air force essentially to abandon the close air support mission.
- (5) The U.S. concept of close air support (using an airborne forward air controller, using voice communications to control strikes, and using nonstandoff ordnance) would result in too many aircraft losses to be generally acceptable unless enemy air defenses were suppressed.
- (6) Attacking well-defended airfields with sheltered aircraft is not a good application of air power using present weapon systems.

38. (U) Soviet doctrine specifies that the tank would be their main offensive weapon.

SECRET

Part 3

Analyses

SECRET

Chapter I

THE WAR IN GENERAL**A. BACKGROUND**

(U) The disastrous Arab defeat in the 1967 Middle East War left the Arab governments humiliated and frustrated and the Israelis overconfident and adamant. The war of attrition during 1968-70 and subsequent U.S. efforts to promote a compromise on the occupied territories brought no change. By the end of 1972, President Sadat of Egypt appears to have become convinced that a major initiative—even if it failed—was necessary to break the stalemate.

(U) Immediately after the 1967 War, the Soviet Union had begun a massive effort to rebuild the Egyptian and Syrian military forces, sending hundreds of advisors to instruct in the operation of the new equipment and to inculcate Soviet doctrine, tactics, and techniques in the Arab forces. Priority was given to Arab defenses against armor and aircraft—the two elements employed by the Israelis with such devastating effect. Special attention was also given to training in artillery, bridging techniques, and other more specialized functions such as electronic warfare and night fighting.

(S) Meanwhile, the Israelis continued to emphasize in their own military establishment the armor and air strike elements that had been the instruments of their previous successes. Their national strategy remained rooted in their strong sense of self-preservation, tempered by the principle that “Israel is a very small country with very few people, which must fight a short duration war requiring rapid decisions in compressed time periods.”¹ The Israelis recognized that the Egyptians might at some point attempt to attack across the Suez Canal, and plans were made for the eventuality.² It was assumed that any buildup on the east bank could be destroyed by armor and air.

1. (U) As stated by a Senior Israeli Defense Force Officer, quoted in *Joint Operational Intelligence Team Final Report*,

2. (S) These plans also included the possibility of an Israeli crossing of the Canal in the same general area in which the actual event occurred on 16 October (see Section D). Various reports have stated that extensive engineering preparations had been made by the Israelis at the precise site of General Sharon's subsequent crossing, including construction of a vehicle park and a weakening of the sand embankment to facilitate bridge emplacement. See *A Summary of Lessons Learned in the Arab-Israeli War of October 1973*, [redacted] and The Marshall Report: *The October War: A Synopsis of the 1973 Sinai-Suez Campaign and a Critique of Weapons and Tactics*, Army Materiel Systems Analysis Agency, AMSAA SP-11, January 1974, SECRET NOFORN.

25X1

25X1

SECRET

SECRET

(S) On the Suez, Israel's Bar Lev Line consisted of a thin chain of isolated fortified strongpoints connected by patrol roads running parallel to the Canal. The strongpoints were some 10 km apart and hence unable to support each other by fire. A steeply sloping sand and clay dike some 10 to 20 meters high had been constructed all along the Canal's eastern edge. Israeli forces on the 94-mile front consisted of an armored brigade with 270 tanks distributed in support of 15 strongpoints, each occupied by 20 to 40 men. Eleven batteries of artillery reinforced the line,³ and supporting Israeli Air Force (IAF) strike units were stationed at Bir Gifgafa. On the morning of 6 October, another Israeli armored brigade arrived in the Sinai.

(S) The Israeli defense on the Golan Heights took advantage of the exceedingly rough terrain that consisted of a maze of basalt rock formations, dead ends, and natural obstacles tending to canalize attacking forces to the road networks. The Israeli-engineered roads, in turn, led to some 15 fortified bunkers on elevated positions affording observation of the surrounding terrain.⁴ The 38-mile cease-fire line itself was buttressed by an antitank ditch, minefields, fencing, and a mobile defense of 185 tanks to fill the gaps. A regular infantry brigade was stationed at Kafr Naffakh, and in the 2 or 3 days prior to the war another armored brigade arrived on the Golan, the last battalion reaching its station only 3 hours before the attack commenced.

(U) Israeli defense strategy prior to the October 1973 War was based on (1) adequate advance warning from their first-class intelligence system of an impending attack; (2) slowing the enemy by a line of strongpoints anchored to an obstacle system, with the main defense mobile in nature and conducted in depth by armor; and (3) rapid mobilization of a well-trained, highly motivated army of reservists.

(U) Egypt and Syria both maintained large standing forces deployed well forward that required little mobilization to bring them to fighting strength. The quality of Arab recruits was considerably below that of the Israelis, however, and continuous active duty was necessary to maintain necessary skills. When the October 1973 War began, the Israeli army was outnumbered by about three to one in terms of active forces, but through mobilization it was able to approximate the 350,000-man combined strength of the Syrian and Egyptian armies.

B. THE PREPARATIONS

(S) The Egyptian canal crossing was minutely planned and rehearsed. At least 40 crossing exercises were held at rear training areas prepared to simulate the Canal; copies of the Israeli embankments were built, and breaching requirements by explosive and water jet were calculated and tested. A series of approximately 100 earthen ramparts, some 160 feet square and 50 feet high, were constructed on the west bank of the Canal to provide

3. (U) The Israeli batteries consist of only four weapons; many U.S. batteries have six.

4. (U) Only 12 of the bunkers were on the border with Syria; 3 were on the border with Lebanon.

SECRET

SECRET

observation (over the Israeli dike on the opposite bank) and fields of fire for tanks and SAGGER antitank weapons. The actual decision to attack was apparently made in May 1973, and some discussion undoubtedly took place between Egypt and Syria—and probably other Arab countries, on a selective and guarded basis—at the 10 September 1973 Arab Summit Meeting. Sadat had been issuing warnings since his Year of Decision (1971) that he would soon attack, that he must attack, that nothing would prevent him from attacking. Partial Egyptian mobilizations were held, followed by apparent demobilizations; units and equipment were moved forward and back, but generally forward; and exercises similar to the actual attack were held in the locations where it eventually occurred. Syrian preparatory actions were in general comparable to those of the Egyptians.

(S) At the time of the attack, Egyptian forces on the Canal comprised two armies: the 2nd to the north and the 3rd to the south. The 2nd Army contained three infantry divisions, one armored division, one mechanized division, and one independent armored brigade, totaling some 800+ tanks and 68,000 infantry troops; the 3rd Army was composed of two infantry divisions, one armored division, one mechanized division, one independent tank brigade, and one independent brigade, totaling some 700+ tanks and 54,000 infantry troops. Both armies were unusually heavily equipped with antitank weapons, especially the RPG-7 and the AT-3 SAGGER.

(S) The Syrian forces available for attack consisted of three infantry divisions, heavily supported by two armored divisions, one independent armored brigade, and massive amounts of heavy artillery (up to 240 mm) and antitank weapons. Syrian forces totaled some 1,400 tanks and 73,000 infantry troops.

(U) In early October 1973 Israel was preoccupied with political considerations, notably the terrorist attack on Jewish emigrants in Austria, and the upcoming parliamentary elections in which top military figures were playing a prominent part. Mobilization was politically unpleasant and economically costly. In the background there remained a general contempt for Arab fighting capabilities. The Arab buildup on both fronts became impossible to ignore in the 2 or 3 days prior to 6 October, but it was still believed that there would be no attack. When clear proof of Arab intentions became available in the early morning hours of 6 October, the only real option left (in the words of the U.S. Defense Attache in Israel) was then employed: "Mobilize the reserve and declare to the world what the Arab plans were in hopes of discouraging an attack."⁵ Israeli mobilization began about 0930 on 6 October.

5. (S) Kosco Report: *Ground Activity of and Subjects Relating to the October 1973 Yom Kipper War.* [redacted]

[redacted] A preemptive strike by the IAF, which was in a state of advanced readiness when the war began, was considered, and ordnance was loaded for an attack on Egyptian SAM sites and airfields. Permission for the strike was refused by the Israeli government, however, apparently largely for political reasons. The decision may have been a wise one for other reasons. The situation was very different from that in 1967: the Egyptians were expecting an air strike; their aircraft were dispersed and revetted; and their air defense capability was formidable, as was demonstrated later.

25X1
25X1**SECRET**

SECRET**C. THE ARAB ATTACK**

(U) On 6 October at 1400, a coordinated attack was launched by Egyptian and Syrian forces against Israeli defense lines. On both fronts the attack began with an intensive artillery barrage lasting approximately 55 minutes. The Israelis, meanwhile, were mobilizing at a frantic pace and rushing units, personnel, and equipment piecemeal to both fronts.

1. The Sinai

(S) On the Egyptian front, the number of artillery pieces in the opening barrage appears to have been unprecedented in warfare, numbering at least 1,200 to 1,500.⁶ Concurrent with the artillery barrage, Egyptian air attacks were made by some 130 aircraft (MIRAGE 5s, SU-7s, MIG-17s, and TU-16s) against Israeli installations to the rear in the Sinai. At 1415, Egyptian infantry began to cross the Canal in small boats between the Israeli strongpoints, most of whose defending personnel were later either captured or killed.⁷ The main crossing points were in the Deversoir sector just above the Great Bitter Lake, at Ismailia and Suez City. Each division crossed in its own sector in a total of 12 waves, with successive waves carrying AT-3 SAGGER antitank missiles, recoilless rifles, machine guns, 82 mm mortars, additional ammunition, mines, and explosives. Elements of Egyptian commando battalions at the same time infiltrated into the Sinai with antitank weapons and laid ambushes for Israeli armor units, which were counterattacking and attempting to relieve the personnel under siege in the strongpoints. Meanwhile, the Egyptians began their operations to breach the earthen embankments. During the night of 6 October and early morning of 7 October, bridges were constructed and armor (organic and attached to the infantry divisions) began to cross.

(S) Once the major elements of the five infantry divisions consolidated their bridgeheads (after about 6 days), two armored divisions and a mechanized infantry division crossed the Canal and deployed on the east bank. The Egyptians pushed forward about 6 to 12 km into the Sinai along most of the length of the Canal, and then largely held position under their air defense umbrella. Although they probed Israeli defenses in relatively small attacks, none attempted a serious breakthrough toward the Mitla or Giddi passes. There are reports that one mechanized infantry brigade attempted to push south to Ras Sudar and another north toward Baluza, but both were blocked by Israeli forces. The Israel Defense Forces (IDF) were greatly outnumbered but conducted effective holding and blocking

6. (S) The Egyptians stated they had 4,000 artillery pieces (guns, mortars, and antitank missiles) deployed along the Canal, and that of these 2,000 participated in the preparatory fire:

These tubes engaged a total of 543 targets. . . . During the preparatory fire phase, there was no Israeli counter-battery fire until H+40. . . . Preparatory firing utilized 100,000 rounds, or 3,000 tons of ammunition. In the first minute, 10,500 rounds were fired at a rate of 175 per second and at a density of 300 rounds per square kilometer.

Hennessey Report: *DoD Military Team Visit to Egypt, 14-23 July 1974, Trip Report, JCS 1887/813, 31 July 1974 (rev. 14 August 1974), Annex D, p. 19, CONFIDENTIAL NOFORN.*

7. (U) All the strongpoints except one eventually fell to the Egyptians. The surviving one was in the marsh area near the northern end of the Canal, out of the direct line of attack.

SECRET

SECRET

operations while waiting for their mobilized forces to arrive. During this early phase of the war, the Egyptian infantry is reported to have destroyed about 200 of the original 270 IDF tanks by attacking them from well-prepared, concealed positions on both sides of the Canal.

(C) In the first 3 or 4 days, the Israeli Air Force (IAF) was forced to devote its primary attention to support of the ground forces—a task made especially difficult and costly by the heavy Arab concentrations of air defense weapons. The entire Israeli defense, moreover, suffered from an inability to use combined forces properly—armor, air, artillery, infantry, and air defenses—in support of each other, because of the piecemeal manner in which they were committed and also to some extent because of the Israeli emphasis on armor and air at the expense of artillery and infantry.

(S) While some controversy exists regarding the objectives of the Egyptian attack, all the evidence—including Egyptian statements, Israeli assessments based on captured documents and POW interrogations, plus the course of events themselves—indicates that an operation was planned in two main phases:

- (1) *Phase I* was to last some 3 days and involved the crossing of the Canal by the five infantry divisions (each reinforced by the attachment of an armored brigade), and the securing of a bridgehead about 10 to 12 km deep, behind which Egyptian forces were to be built up on the east bank. In the south, a secondary effort was to be made to capture Ras Sudar and, ultimately, Sharm el Sheikh. Commando battalions, chiefly inserted by helicopters, were to seize the western exits of the Sinai passes, delay Israeli reinforcements, and establish ambushes. With the completion of Phase I, the Egyptians were to assume an “operational pause,” during which they were to go over to the defensive and attempt to destroy as much Israeli armor and as many personnel as possible in the anticipated Israeli counterattacks. The length of this operational pause was to depend on various political-military factors, especially the progress of the Syrians.
- (2) *Phase II* was to last some 3 to 5 days. Egypt’s main armored and mechanized formations, supported by the infantry, were to advance on multiple axes to the Sinai passes, proceed through them, and establish a north-south defense line approximately as far forward as Bir Gifgafa. This advance was to be accompanied by the movement to the east bank of some Egyptian surface-to-air missiles to provide extended air defense coverage. There are no indications that the Egyptians planned to go beyond Phase II objectives—which were, of course, never achieved.

2. The Golan Heights

(S) Because of the proximity of the Golan Heights to the Israeli heartland, the Syrian offensive posed a more urgent threat than the simultaneous Egyptian attack. In short, there was no sand to trade for time, as in the Sinai. No clear evidence exists regarding Syrian objectives, but it is reasonable to assume that they intended to regain their lost territory in

SECRET

SECRET

the Golan and then to push directly into the Israeli agricultural communities around the Sea of Galilee.

(S) Preceding the main assault, Syrian division engineers—supported by armor and infantry—began to breach the Israeli minefields and antitank ditches. The engineering operations cleared several passages (by tanks with rollers, bridging, and then bulldozers backfilling ditches) for attacks by each of the six infantry brigades on line, supported by some 240 tanks. The attacks were in three basic sectors: north of Quneitra, attacking to the southwest; north of Rafid, attacking to the west toward Khushniya; and south of Rafid, attacking to the northwest and southwest. Israeli strongpoints and observation posts were generally bypassed in an effort to maintain the momentum of the attack. Only one of the Golan strongpoints eventually fell—Mt. Hermon—and the Syrian attack was to suffer later from the surviving points of resistance in the rear.

(S) The Syrians were unable to penetrate the Israeli defenses in the northern sector of the front but made breakthroughs of several kilometers in the central and southern sectors. The Syrian attack slowed of its own accord, however, and then bogged down as Israeli resistance began to mount. The IAF was devoting priority attention to the Golan front, and on the ground, mobilized personnel were committed to battle as rapidly as they reported for duty.⁸ Within little more than 24 hours of the initial attack, the Syrians began to deploy in defensive positions. As of 7 October about 1,100 Syrian tanks had been committed to battle, and a large part of these had been lost.

(S) Two IDF reserve divisions were now on the Golan, and by 8 October a third IDF division consisting of armored and mechanized units was in place. By 9 October the Syrians had been pushed back in the El Al area (southern sector) but still retained their foothold west of Khushniya. Attacks by Syrian forces near Khushniya and in the Quneitra area failed, and toward evening the Syrian salient had been reduced substantially. By 10 October the Syrians had been pushed back behind the 1967 cease-fire line. On 11 October the Israelis launched their counteroffensive, and by 12 October they were well past the DMZ and the 1967 cease-fire line, and far along the road to Damascus. The extensive and deep Syrian defensive positions were becoming an obstacle, however, and, more importantly, the Israelis wished to turn their primary attention to the Sinai front—which they now did after a total of 8 days of fighting, during which the Syrian front had become stabilized. Of some 1,400 Syrian tanks at the beginning of the war, 1,100 were apparently lost. Two Iraqi armored divisions and one Jordanian armored brigade were also badly mauled. A Moroccan tank brigade was reportedly destroyed.

(S) Syrian use of armor in their attacks appeared to adhere closely to Soviet textbook procedures, with little adjustment for terrain or tactical circumstance. Once fully deployed, they usually attacked in line formations in successive waves, without employing mutual support tactics between tank subelements, moving by bounds in a manner to take

8. (S) Israeli unit personnel were sometimes mixed, as even were tank crews, and units were occasionally forced to share equipment.

SECRET

SECRET

advantage of the terrain, or otherwise altering prescribed distance intervals because of varying circumstances. The Syrians fired on the move in mass attacks, and then, as the battle closed, from short halts. After firing one or two shots they usually moved on, regardless of whether they scored a hit. Engagement ranges were relatively short—1,000 to 1,500 meters. Syrian tank gunnery was poor in accuracy and rate of fire, and Syrian tank crew members were not cross-trained in each others' positions.

(S) The Syrian Air Force (SAF) appeared to have one primary mission during the October 1973 War—air defense. In fact, with the exception of anti-aircraft units organic to army ground units, all air and ground air defense assets are under the SAF. Secondary SAF missions included close air support (preplanned, not close air support in the conventional sense), heliborne assaults, long-range attacks against targets inside Israel, and reconnaissance. Most air battles were initiated by the Israelis. According to the IAF, Syrian pilots demonstrated more imaginative tactics than did the Egyptians (e.g., flying at lower altitudes and at slower speeds). However, the Syrians were poor at gunnery and often fired air-to-air missiles while out of range. Iraq also contributed some fighter aircraft with pilots during the war; apparently both the Israelis and the Syrians held Iraqi flying ability in low esteem.

(S) In spite of the Syrian deficiencies in armor and air operations, they were clearly much improved over their showing in 1967. When the October 1973 War ended, they were still fighting as units despite their losses, and their retreat was generally accomplished in good order. [redacted] the following as the consensus of IDF northern front commanders:

The Syrians were good fighters; they were brave and fought with a "doggedness" not displayed by other Arab Armies. The Syrians moved well at night, but were not flexible to adjust to a changing situation. In essence the IDF has a new respect for the Syrians.⁹

(S) One of the more successful Syrian operations in the October 1973 War involved the capture of Mt. Hermon on 6 October. The attack began with an attempted landing near the strongpoint by three Syrian helicopters carrying 15 commando troops each. One helicopter was shot down, but the other two landed safely and the troops dug in to block Israeli reinforcements. The remainder of the Syrian commando battalion approached on foot under artillery cover and, with the aid of one other helicopter landing of a "suicide" force of 20 men about 400 meters away from the Israeli position overran the strongpoint at about 1700. Israeli attempts to recapture the positions of Mt. Hermon were thwarted until 22 October, when, after considerable losses in the interim, they finally succeeded.

9. (S) Kosco Report, op. cit., p. 21. Apparently the "other Arab Armies" referred to were the Iraqis, Jordanians, Saudi Arabians, and Moroccans. The Israelis felt the Jordanians did not have their hearts in the fight and were merely going through the motions; as for the Iraqis: "The Iraqis are amateurs and lucky is the Army blessed with such an incompetent enemy." Ibid.

SECRET

SECRET**D. EGYPTIAN BREAKOUT ATTEMPT AND ISRAELI COUNTERATTACK**

(S) Once the Egyptians secured their bridgeheads, they did not attempt any further advances for about a week. During this time they transported large amounts of supplies, ammunition, and equipment to their forward areas on the east bank and subjected Israeli forces to heavy artillery shellings and, as mentioned earlier, to small-scale probing attacks. On 14 October at 0630, three brigades of the Egyptian 21st and 4th Armored Divisions attacked Israeli units between Ismailia and the Great Bitter Lake in an apparent breakout attempt.¹⁰ These attacks were a complete failure, and in the process the Egyptians appear to have lost some 200 to 300 tanks, with relatively few losses on the Israeli side, because of the superior tank-on-tank abilities of the Israeli armored units.¹¹ In maneuvering, gunnery, and individual initiative in taking advantage of the tactical situation, the Israelis were immensely superior to the Egyptians. One brigade of the 21st Armored Division was virtually destroyed, weakening the Egyptian forces near the north end of the Great Bitter Lake, where the Israelis planned to counterattack on 16 October.

(S) On the night of 15 October, advance elements of an IDF armored division commanded by Maj. Gen. Sharon drove between the Egyptian 2nd and 3rd Armies just north of the Great Bitter Lake and reached the Canal. Israeli paratroops crossed the Canal on rubber rafts on the morning of 16 October and began to raid SAM sites on the west bank. Two IDF armored divisions then deployed to guard against attempts by the Egyptians to close off the bridgehead, and there resulted the most massive tank engagements of the war—the Battle of the Chinese Farm.¹² Three Egyptian armored brigades were destroyed or neutralized in the intense tank-to-tank combat. With the bridgehead secured, two Israeli armored divisions (Sharon's and Adan's) successively crossed the Canal, fanning out to the northwest and south to destroy rear area services and air defense units. Elements of a third IDF division (Maj. Gen. Kalman Magen's) crossed subsequent to Adan's division.

(S) The Egyptians appear to have been unaccountably slow in realizing the scale of the Israeli crossing operation and to have consistently underestimated the actions required

10. (S) It is generally inexplicable why the Egyptians waited this long to make such an attempt, and also why their attack was not more massive, if they intended a genuine breakout. The best explanation appears to be that the operation was conducted in an effort to relieve the pressure on the Syrians. This is what the Egyptians themselves stated (see Hennessey Report, op. cit., Annex D, p. 5) and also what the Israelis apparently believed [redacted]

[redacted] The Egyptians also stated that their breakout attempt required them to move out from under their air defense umbrella and in the process they took heavy losses from the IAF. However, any significant Egyptian tank losses to the IAF appear to be unsubstantiated.

11. (S) The Israeli 14th Armored Brigade lost 32 tanks in this engagement and claims to have destroyed 86. One battalion within the 14th Brigade—the 79th—claims to have destroyed 30 to 40 Egyptian tanks and lost 1 (see Kosco Report, op. cit., p. 28).

12. (U) According to the Marshall Report (op. cit., p. 43), the battle acquired its odd name as follows:

Near dead center of [the flat where the battle took place] is a large pumping station. The Egyptians had planned to reclaim the area by bringing fresh water from the west bank, a project that did not otherwise materialize. When the Israelis overran the station in 1967, they found Japanese inscriptions on the machinery, mistaking them for Chinese characters.

SECRET25X1
25X1

SECRET

to counter it.¹³ They did keep the crossing point itself under more or less constant artillery fire,¹⁴ and on 16 October the Egyptian 24th Armored Brigade launched successive attacks in three battalion waves at 90-minute intervals in a fruitless attempt to dislodge the Israelis from their bridgehead. The next morning the Egyptian 25th Independent Armored Brigade, which had only 60 tanks because of prior losses in the 14 October breakout attempt, moved north against the bridgehead but was ambushed by the IDF and lost all its armor. All in all, it appears to have been several days before the Egyptian high command had an accurate assessment of the situation and realized the potential implications of the Israeli bridgehead on the Canal.

(S) On about 19 October the Egyptians began desperately to try to stem the flow of Israeli forces across the Canal and to halt their advance to the south. Egyptian 1st Army units were sent from the Cairo area, and units of the 4th Armored Division returned from the east bank in an attempt to stop the IDF advance. On 19 October the Egyptians lost 60 tanks on the east bank, and on 21 October the IDF knocked out an additional 60 on both banks. By this time the IDF had approximately 20,000 troops and 500 tanks on the Egyptian side of the Canal.

(U) During the 4 days (19-22 October) preceding the first U.N. cease-fire, the IAF was able to provide excellent close air support after their ground forces neutralized the Egyptian anti-aircraft and missile sites on the west bank. As a result, not only were IDF operations on the west bank facilitated, but the Egyptian forces on the east bank found their supply lines increasingly under attack.

(U) At the time of the first U.N. cease-fire on 22 October, IDF forces on the west bank extended as far north as Ismailia but had not yet reached the edge of the Great Bitter Lake. In continued fighting after the cease-fire, the Israeli drive was extended south until the Great Bitter Lake was reached. By the second cease-fire on 24 October, the Egyptian 3rd Army was effectively cut off from the west bank.

(S) The strategic import of the Israeli canal crossing and encirclement of the Egyptian 3rd Army on the east bank will long be a matter of controversy. Lt. Gen. Gamassy, the Egyptian Chief of Staff, stated that the Israeli crossing was a "tactical success. . . [but] presented no problem on a strategic level."¹⁵ He admitted that the loss of SAMs and anti-aircraft guns on the west bank created a gap in the Egyptian air defense system and gave the Israelis local air superiority. He claimed, however, that the Egyptians had two mechanized divisions and almost a full armored division with which to counter the Israeli crossing force. Asked to describe the situation of the 3rd Army at the close of the

13. (S) This was later admitted by Lt. Gen. Gamassy, the Commander in Chief of the Egyptian Armed Forces. See the Hennessey Report, op. cit., Annex H, p. 3.

14. (S) According to the Kosco Report (op. cit., p. 32):

During the first day of bridging 41 soldiers from all IDF branches were lost as a result of the Egyptian 240 mm Katyusha Rocket attacks. In the first 4½ days of bridging 35 engineers were killed and 150 WIA—including a high proportion of unit commanders.

15. (U) Hennessey Report, op. cit., p. 3.

SECRET

SECRET

war, Gamassy stated that it was composed of 2 infantry divisions reinforced with 2 armored brigades and supported by 22 battalions of artillery. This force, he said, had enough ammunition, fuel, water, and most other supplies, plus the will, to continue to resist. Their weakest link was their diminishing food supply—enough for about 5 to 7 days. Thus, about 27 or 28 October, “it was becoming absolutely necessary for the Egyptians to launch a major counterattack to try to break the Israeli encirclement of the 3rd Army.”¹⁶ The Americans, said Gamassy, sensed that this was precisely the right time to step in at the political level and secure a final cease-fire.

(S) The Israelis allowed the crossing operation to develop by its own momentum, without regard for the strategic, political, and economic consequences. Israel had between five and six divisions committed and tactically tied down in far western Sinai and in northwest Egypt between Ismailia and the mountains south of Suez City. Throughout the cease-fire these forces had to be logistically supported from Israel, and with no natural defenses they had to remain fully mobilized despite the strain on the Israeli economy:

In more ways than one, Sharon's advance into Egypt—as audacious an operation as any in modern times—scuttled Israel, and while contributing to its posthostilities confusions, became a block to its economic recovery. . . . By far over-extending the army, it strapped the nation. Further, it promised nothing in return: there was no way to back off from it without seeming to admit defeat.¹⁷

(C) Whatever the implications of the encirclement, it is clear that from a military standpoint the 3rd Army was in a precarious situation. Egyptian attacks—other than their initial long-term one—resulted in little success, and there is no reason to believe that an attempted 3rd Army breakout would have had more. With Egyptian ammunition, equipment, and food in short supply, and the Israelis in complete control of the air, it appears highly probable that the Israelis could have systematically destroyed the 3rd Army. Attacks by other Egyptian forces may have helped to relieve the pressure, and certainly there would have been additional Israeli casualties to add to the already punishing total; but all in all, the Egyptian military future was not bright when the second cease-fire was imposed.

(U) How, or if, the overall political or strategic outcome might have been affected by continued fighting is, of course, another question—and perhaps an irrelevant one. Both the United States and the Soviet Union had become militarily involved to the point of alerting their own forces. The Soviets apparently believed that they had been betrayed on the first cease-fire by both the United States and Israel, and the United States suspected a Soviet attempt unilaterally to inject its forces into the conflict. Clearly, neither of the two superpowers wished to see a continuation of the October 1973 War.

16. (U) Ibid.

17. (U) Marshall Report, op. cit., pp. 53-55.

SECRET

SECRET**E. MISCELLANEOUS ASPECTS OF THE WAR****1. The Naval War**

(S) While all the decisive action took place in the ground war and, to a lesser extent, in the air war, there was considerable naval activity highlighted by engagements between Israeli SAAR class guided missile boats equipped with the GABRIEL surface-to-surface missile and Arab OSA/KOMAR class guided missile boats equipped with the STYX surface-to-surface missile. In these battles—the first naval guided missile exchanges ever—the Israeli tactics and training proved overwhelmingly superior. The Israelis suffered no hits while inflicting a total of 17, resulting in the sinking or damaging of 6 Arab craft and 3 neutral merchant vessels.

(S) The Arab naval blockade of the Bab el Mandeb Straits at the mouth of the Red Sea, while posing no immediate problems to the Israelis, was successful—at least it was not challenged—and raises potentially serious problems for Israel in a future prolonged war.

2. Soviet Influence on the Arab Forces

(S) Heavy Soviet influence on Arab doctrine and training was readily evidenced by tactical formations used on both fronts as well as by Arab employment of weapon systems. However, there are also numerous examples of Arab innovations that reflect independence in planning and execution. The equally numerous examples of Arab failures to make optimum use of Soviet equipment (e.g., taking 4 to 5 hours to install a bridge that the Soviets reportedly could install in 10 to 15 minutes; lack of flexibility in tank maneuvers and tactics; failure fully to utilize night vision equipment; poor aircraft pilot training and performance) emphasize the dangers in drawing precise conclusions regarding Soviet military capabilities.

3. Arab Intelligence Operations

(S) Israeli personnel state that Arab intelligence was effective in collecting a large volume of information on Israeli forces. Egypt in particular improved its intelligence-gathering capabilities, with additional monitoring and direction-finding equipment as well as a large number of newly trained, Hebrew-qualified interrogators and SIGINT operators. However, the Arabs did poorly in collating and analyzing the raw material.

4. Arab Logistics

(S) There is no evidence of major supply shortages in Egyptian forward-deployed forces. (Little information is available on Syrian logistics.) Fixed army logistics installations extended back approximately 70 km from the Canal, advanced logistics bases were established close to the west bank, and POL and ammunition dumps were set up well forward. The Egyptians are reported to be highly pleased with the performance of their logistical system. Senior Egyptian officers stated, however, that they were aware that the main supply bases and the front lines were only 120 km apart, that railroads and military

SECRET

SECRET

and civilian convoys were available to move supplies, and that their forces had had an opportunity to prestock supplies in the canal zone over the past 6 years. It would have been difficult to maintain this excellent resupply effort, they said, had their forces moved deeper into the Sinai.

5. Military Cooperation Between Arab Governments

(S) Military cooperation and coordination between Arab governments appears to have been limited to the timing of the initial attack and the contribution of token contingents to the Egyptian and Syrian fronts. Once in country, these foreign contingents were subordinated to local or national commanders, and command and control remained a problem.

SECRET

TOP SECRET**Chapter II****THE GROUND WAR**

(U) This chapter is divided into three sections. Section A presents weapon and ordnance data for the principal combatants in the 1973 Middle East War. Sections B and C address important issues relevant to the interactions of ground forces and ground-based air defense weapon systems, respectively.

A. INVENTORY OF WEAPONS AND ORDNANCE FOR ISRAEL, EGYPT, AND SYRIA

(U) Tables 7 and 8 present the inventory, losses or expenditures, and resupply of principal Israeli weapons and ordnance, respectively; Table 9 presents similar data for Egypt and Syria. In these tables, zero denotes none, a dash means that the category is not applicable to the item, and a blank means that the information is not available.

B. INTERACTIONS OF GROUND FORCES**1. Armor**

(S) At the outbreak of the October 1973 War, the combined Arab forces had about twice as many main battle tanks as the Israelis. During the war, however, the Arabs reportedly lost about 2.5 times the number of tanks as the Israelis. The following discussion focuses on the factors contributing to this result.

a. Main Battle Tanks

(S) Over three-quarters of Israel's prewar inventory of main battle tanks consisted of U.K. MK 13 Centurion tanks and U.S. Patton tanks (M-60A1 and modified M-48 Tanks).¹ Soviet T-54/55 and T-62 main battle tanks comprised three-quarters of the prewar inventories of Egypt and Syria. Table 10 provides a comparison of the major characteristics of these tanks. In addition, the Israelis employed Sherman M-50 and M-51 main battle tanks, and the Egyptians and Syrians employed Soviet T-34 main battle tanks.

1. (U) The modified M-48 is very similar to the M-60. The M-60A1 has a different turret and commander's cupola than the M-60.

TOP SECRET

TOP SECRET

Table 7 (TS). Inventory of Principal Israeli Weapons

25X6

*War losses include weapons captured or destroyed. Damaged items that are repairable are not included.

†Items captured or produced by Israel during war included.

‡Reference a reports an additional 326 tanks (58 M-60/Modified M-48, 250 Centurion, 20 T-54/-55) that were damaged but repairable.

§Resupply only (ignore prewar inventory and war losses).

□Not used during war.

△Some may be recoverable.

References a through d were used to compile this table. Letters placed in the upper right-hand corner of a column heading or a block refer to all entries in that column or block, except for individual data entries that have reference letters.

a. Data supplied by Project NICKEL GRASS Office, August 1974, SECRET. Pertains only to resupply.

b. *Preliminary Assessment of the Effectiveness of Weapon Systems Used by the Opposing Forces in the October 1973 Middle East War*, WSEG Report 225, February 1974, TOP SECRET NOFORN/U.S. EYES ONLY.

c. *Data From the October 1973 Middle East War*, WSEG Report 237, Vol. II and III, October/November 1974, SECRET NOFORN (Except Israel).

d. *Final Trip Report, U.S. Military Equipment Validation Team (USMEVTI)*, JCS 2369/49-2, 20 November 1973, TOP SECRET/SENSITIVE. Also referred to as *The Casey Report*.

TOP SECRET

TOP SECRET

Table 8 (TS). Inventory of Principal Israeli Ordnance

25X6

*War losses include weapons captured or destroyed and ordnances captured, destroyed, or expended. Damaged items that are repairable are not included.

†Items captured or produced by Israel during war included.

‡Israeli peacetime production not included.

§Resupply only (ignore prewar inventory and war losses).

||Not used during war.

∧20 used in operations after war; approximately 330 used for training.

∩Ammunition used in engagements that accounted for about 30 airplane losses. There were another 12 airplane losses attributed to 20 mm and 40 mm AA for which ammunition expenditure is unknown.

References a through c were used to compile this table. Letters placed in the upper right-hand corner of a column heading or a block refer to all entries in that column or block, except for individual data entries that have reference letters.

a. Data supplied by Project NICKEL GRASS Office, August 1974, SECRET.

b. *Final Trip Report, U.S. Military Equipment Validation Team (USMEVTI)*, JCS 2369/49-2, 20 November 1973, TOP SECRET/SENSITIVE. Also referred to as *The Casey Report*.

c. *Data From the October 1973 Middle East War*, WSEG Report 237, Vol. III and IV, October/November 1974, SECRET NOFORN (Except Israel).

TOP SECRET

TOP SECRET

Table 9 (TS). Inventory of Principal Arab Weapons

	Prewar Inventory		Comments on Arab Weapon Losses and Ordnance Expenditures
Tanks			895-1,000 Arab tanks lost or damaged on [] of which an estimated 631 were destroyed or captured; 1,032-1,230 Arab tanks lost or damaged on [] with an estimated 643 destroyed or captured (Reference d). [] losses include losses to [] (starting inventories for these two countries not reflected here in [] prewar inventory).
PT-76 (Light Amphibious)	70	80	
T-34	380	300	
T-54/55	1,465	1,220	
T-62	120	120	
JS-3 (Heavy)	0	85	
	2,035	1,805	
APCs (in Maneuver battalion only) BTR-50/OT-62, } BTR-60, BMP }	1,530	602-634	1. OT-62 is Czechoslovakia's version of BTR-50PK. 2. 500 [] APCs reported lost in war.
Antitank Weapons			[] is reported to have 1,200 83 mm M-1951 antitank rocket launchers (Reference b).
82-107 mm Recoilless Rifle	670-720	890	
57 mm Antitank Gun	356	145	
85 mm Antitank Gun	288	36	
100 mm Antitank Gun	36	62	
RPG-7V	2,500	2,820	
AT-3 SAGGER/Manpack	514	150	
BRDM-2/SAGGER	174-192	72	
UAZ-69/SNAPPER (AT-1)	24	0	
Artillery and Mortars			1. Reference b reports 570 122 mm field guns and 432 122 mm howitzers in the [] 2. Reference c reports 290 122 mm field guns and 150 122 mm howitzers in the []
122 mm Howitzer	688	342	
130 mm Gun	108	82	
152 mm Gun	72	37	
180 mm Gun	4	4	
Multiple Rocket Launchers (122-240 mm)	72	16-24	
60 mm Mortar	275	280	
81-82 mm Mortar	540	335	
120 mm Mortar	258	246	
160 mm Mortar	72	48	
240 mm Mortar	24	0	
Air Defense			1. Estimated postwar Arab inventories (prewar inventory - losses + resupply) as of 11/30/73 are: • SA-2/SA-3 firing units—150 for [] • SA-6 firing units—15 for [] 2. Estimated Arab missile expenditures during war are: • 2,000-3,000 SA-2s/-3s/-6s. • 5,000 SA-7s (out of inventory of 20,000).
AA Guns	1,478-1,746	694	
SA-2/SA-3 Firing Units (Launchers)	140 (800)	22 (90)	
SA-6 Firing Units (Launchers)	10 (40)	15 (60)	
SA-7 Launchers	366	120	

The references listed below were used to compile this table.

- [] Overview Data, a paper received by WSEG in October 1973.
- Data From the October 1973 Middle East War, WSEG Report 237, Vol. III and IV, October/November 1974, SECRET NOFORN (Except Israel).
 - GFOB-14, U.S. Army Forces Command Intelligence Center, August 1973, SECRET.
 - GFOB-23, U.S. Continental Army Command Intelligence Center, June 1973, SECRET.
 - Preliminary Assessment of the Effectiveness of Weapon Systems Used by Opposing Forces in the October 1973 Middle East War, WSEG Report 226, February 1974, TOP SECRET NOFORN/U.S. EYES ONLY.

TOP SECRET

25X1

25X1

25X1

25X1

25X1

25X1

25X1

25X1

25X1

25X1

25X6

Table 10 (C). Main Battle Tanks

Characteristic/Item	M-48A3 (U.S.) *	Arab Tanks		
		Centurion (U.K.) †	T-55 (USSR)	T-62 (USSR)
Primary Armament—cannon	105 mm (rifled)	105 mm (rifled)	100 mm (rifled)	115 mm (smoothbore)
Secondary Armament—machine guns	two 7.62 mm	two 30 caliber	two 7.62 mm	one 7.62 mm and one 12.7 mm
Combat Weight (tons)	52	56.2	39.7	41.3
Cruising Range (miles)	310	not available	310 w/integral tanks, 444 w/ aux. tanks	404 w/ aux. tanks
Height (inches)	107	118	91.5	94.5
Engine (horsepower)	750 (diesel)	635 (gasoline)	580 (diesel)	572 (diesel)
Number of Gears: forward/reverse	2/1 (automatic)	5/2 (manual)	5/1 (manual)	5/1 (manual)
Pull/Replace Power Pack (hours)	3.5	not available	8.5	8.5
Protection on Turret Front (inches of armor)	4.4	5.93	8.07	9.0
Ammunition ‡	18-20 AP 12-13 HEAT 25-26 HEP 3 WP	28-30 APDS 12 HEAT 28-29 HESH	8 APDS 8 APHE 6 HEAT 23 HE	20 HVAPFSDS 6 HEAT-FS 14 HE
Ammunition Storage Capacity (rounds)	62	70	43	40
Fire Control:				
Rangefinder	coincidence	ranging machine gun no	stadimetric no	stadimetric mechanical
Computer	mechanical	yes	yes	yes
Stabilization	no	commander IR in some models	active IR (800 meters)	active IR (800 meters)
Night Vision	active IR (1,000 meters)	-10/120	-4/+17	-4/+17
Gun Depression/Elevation Limits (degrees)	-8.4/+19			
Max. Rate of Power Traverse (degrees/second)	24	14	17	17
Suspension	torsion bar, suspended live track	horizontal coil springs	torsion bar, flat dead track	torsion bar, flat dead track
Fording Depth (feet)	4.0	4.75 (15/w snorkel)	18 (snorkel)	18 (snorkel)

*M-48A3 armament retrofitted by Israel.

†The Centurion employed by the Israelis is said to have over 2,000 modifications to the original model, including a WS-AVD5 1970 diesel engine, a CD 850-6 transmission, and an additional fuel tank across the rear of the chassis.

‡Israeli tank ammunition distribution is a composite of the most frequent distribution by main gun round as reported by Israeli tank commanders in the WSEG Armor Questionnaire.

AP	Armor-Piercing	HE	High-Explosive	HESH	High-Explosive Squash-Head
APDS	Armor-Piercing Discarding-Sabot	HEAT(FS)	High-Explosive Anti-Tank (Fin-Stabilized)	HVAPFSDS	High-Velocity Armor-Piercing Fin-Stabilized Discarding-Sabot
APHE	Armor-Piercing High-Explosive	HEP	High-Explosive Plastic	WP	White Phosphorous

SECRET

SECRET

SECRET

Israeli Tank Forces. (S) The Israelis prefer the U.S. and U.K. tanks to the captured Soviet tanks in their inventory. The U.S. and U.K. tanks have a 50 percent greater main gun ammunition storage capacity and a greater gun elevation limit. However, the Soviet tanks are lighter, lower, and have a greater cruising range (with auxiliary fuel storage).

(S) The Israelis like the speed, agility, reliability, human engineering, and fire control systems of the Pattons. Shortcomings of the Pattons that have been confirmed by the Israeli Ministry of Defense are:

- (1) Increased vulnerability due to the storage of ammunition in the turret bustle.
- (2) Poor reliability and stoppages of the coaxial machine gun.
- (3) Restricted visibility of the commander's cupola, and difficulty in operating the commander's M-85 machine gun.
- (4) High silhouette of the tank, which is further increased by the commander's cupola.
- (5) Inability of the tank commander to view the battlefield fully without exposing his head and shoulders.

In addition, it was reported that antitank rounds penetrating the turret ignited pressurized hydraulic fluid, causing serious burns to crewmen and sometimes catastrophic fires. Searchlights, headlights, and externally mounted equipment not protected by armor were reported to have been damaged early in the war due to small arms and artillery fire. To correct some of the deficiencies, the Israelis are replacing the coaxial machine gun, removing the commander's cupola, and installing a three-position hatch and a pedestal-mounted machine gun for the commander. They also plan to use a hydraulic fluid with a higher flash point.²

Arab Tank Forces. (S) The Soviet T-62 was seen in combat for the first time in the October 1973 War. [redacted] of the T-62 is underway. [redacted] it is an improved T-55 with a 115 mm smoothbore main gun. The T-62 is fitted with a TKN-3 combination day-night periscope intended for use with an active infrared source at night. One of the captured T-62s had mountings for a mine plow used in clearing lanes through minefields. [redacted]

(S) In simulated tank duels averaged over different ranges and terrain conditions and with equal forces committed, about twice as many M-60A1s are lost as T-62s.³ The primary reason for the inferiority of the [redacted]

2. (U) CACDA Report: *Analysis of Combat Data—1973 Mideast War*, U.S. Army Combined Arms Center, ACN 22216, Volume VIII, "Recommendations," June-July 1974, SECRET NOFORN.

3. (U) *Main Battle Tank Study*, WSEG Report 248, October 1974, SECRET.

4. [redacted]

25X1

25X1

25X1

25X1

25X1

25X4

SECRET

TOP SECRET

25X1

[redacted] In addition, the small size of the T-62 permits it to have excellent armor and a small, well-shaped turret even though it weighs less than the M-60A1.

(S) Israeli tank crews do not like the T-55 because of the difficulty of operation in the cramped crew space, the limited main gun ammunition storage capacity, and the antiquated power train and fire control systems. They do like its low silhouette.

(S) It has been reported that the Arabs used the T-62 tactically as they did the T-54/55. If this is the case, they did not take advantage of its greater engagement range capability and the greater lethality of its HVAPFSDS round.

Evaluation of Damaged Tanks. (S) A CVAT⁵ examination of 119 Israeli tanks and 435 Egyptian and Syrian tanks for degree and cause of damage revealed that, in general, less than 1 percent of the various kills were attributed to mines, artillery, or aircraft.⁶ Table 11 presents the distribution of impacts and perforations on all Arab tanks by munition. In general, armor piercing (AP) ammunition was the antitank round most preferred by Israeli tankers.⁷

(S) Additionally, 178 tanks (130 Arab, 48 Israeli) of the total sample had only one impact each. Of these, only 21 suffered no serious damage. Ninety-eight of the Arab tanks were T-54/55s. Of these, 38 percent were impacted by AP rounds, 36 percent by High-Explosive Anti-Tank (HEAT) rounds, 22 percent by High-Explosive (HE) rounds, and 4 percent by undetermined munitions. Eighty-one percent of the AP rounds that impacted perforated the tanks. By comparison, only 43 percent of the HEAT rounds and 68 percent of the HE rounds perforated given an impact.

(S) The CVAT judged the Arab tanks they examined to be a representative sample of all Arab tanks damaged or killed during the war. If this is true, the data presented above substantiate the Israeli claim that over 90 percent of Arab tank losses were caused by Israeli tanks. Because of the severe damage of the Israeli tanks examined, the CVAT concluded

Table 11 (S). Distribution of Impacts and Perforations on 435 Arab Tanks

<i>Munition Type</i>	<i>Impacts (%)</i>	<i>Perforations (%)</i>
Armor Piercing	43	49
HEAT	32	33
HE	17	17
Unknown	8	1
	<u>100</u>	<u>100</u>

HEAT—High-Explosive Anti-Tank; HE—High-Explosive

5. (U) The Combat Vehicle Assessment Team was a group of U.S. military personnel sent to Israel to determine the degree and causes of damage to tanks and other combat vehicles. Data were collected in two phases over the period from 3 January to 8 May 1974.

6. (U) Chapter III, Section D, discusses the number of tanks killed by the Israeli Air Force during the war.

7. (TS) Approximately three times as much AP ammunition was expended by Israeli tankers as High-Explosive Anti-Tank (HEAT) ammunition during the war. Sixty-seven percent of the Israeli prewar inventory of AP ammunition was expended during the war (Table 8).

TOP SECRET

TOP SECRET

that these tanks were not representative of the total population of damaged Israeli tanks. The Israelis made a maximum effort to retrieve damaged tanks from the battlefield. Many of these were repaired in the field. Others too badly damaged for field repair were either left or evacuated for subsequent repair in depot.

Israeli Training. (S) The Israeli Armor School provides both individual and crew instruction in all duties, including gunnery. After learning basic position skills, the crew member progresses to tank commander by completing separate courses and gaining experience. The Armor Command trains units and teaches tactics to officers and senior NCOs. Tank gunners qualify twice each year, expending a total of 65 main gun rounds annually⁸—12 to 15 rounds individually and 50 to 53 rounds with their crew. It is reported that the Israeli tank gunner's goal is the destruction of his target at ranges beyond 3,000 meters. Realistically simulated target engagements are used extensively in unit training. Reserve units undergo a 2-year training program. Throughout this program, there is a striving for complete mastery of all tank systems.

Arab Training. (S) After the 1967 Six-Day War, many Egyptian tank commanders were recruited from colleges and universities in order to upgrade the educational level and technical capabilities of their armor forces. Little is known of the details of armor crew or unit training. Syrian tank crew members were not cross-trained (gunners could not drive, etc.); the Syrians were reported to abandon their tanks whenever a crew member was wounded or killed. In general, Arab tank gunnery and crew training appears to have been relatively ineffective in light of Arab armor performance in combat.

Israeli Tactics. (S) Israeli platoon and company commanders assign sectors of fire to their subordinate elements. As in U.S. doctrine, each tank commander directs firing, designating targets with his rangefinder and issuing commands accordingly. When not under artillery fire, the tank commander has his head and shoulders exposed from an open hatch in order to see the battle. He employs his machine gun against appropriate ground and air targets. The loader's and driver's hatches are fully closed during combat. Doctrine establishes battlesight⁹ at 1,000 meters with a HEAT round and calls for tanks to engage at maximum range with their main guns. The first round is an aimed round; accuracy is stressed over rate of fire. From a full halt, the first main gun round is to be fired within 9 to 15 seconds. Burst-on-target is employed for fire adjustment of the main gun.¹⁰

(S) Since Israeli tanks were usually outnumbered, they engaged Arab tanks at extended ranges, employed ambushes on armor avenues of approach, fired from prepared defilade positions, and employed mobile defense doctrine to counter Arab armor

8. (S) About the same as U.S. tank gunners.

9. (U) *Battlesight* is a combination of predetermined range and ammunition, indexed into the fire control, with the specified ammunition loaded in the main gun. It is employed against dangerous, surprise targets to speed the initial engagement time by eliminating the need for crew members to determine range and load the main gun.

10. (U) *Burst-on-target* is a means of adjusting subsequent main gun fire by the tank gunner without further orders from the tank commander.

TOP SECRET

SECRET

penetrations. Over three-quarters of the targets engaged by IDF tank commanders were combat vehicles, although they also engaged infantry and antitank weapon positions.¹¹

(S) IDF tank commanders surveyed expended an average of 109 main gun rounds during the war.¹² On the average, there was little difference in main gun ammunition expenditure per tank with respect to area of operation.

(S) Forty-four percent of Regular Army tank commanders surveyed responded that, during their most intense day of combat, they had a minimum of 10 rounds or less remaining in their tank after an engagement and before being resupplied.¹³ More than half of all tank commanders surveyed had fewer than 20 rounds remaining in their tanks under similar circumstances. Over three-quarters of Israeli tanks have main gun ammunition capacities of 63 rounds or more.

(S) Israeli tankers did not have an antipersonnel round during the war.¹⁴ Their Pattons and Centurions are reported to have fired High-Explosive Plastic (HEP) and High-Explosive Squash-Head (HESH) rounds, respectively, against infantry. Tank commanders indicated a preference for more machine gun ammunition and hand grenades when questioned after the war.¹⁵ They may have found themselves restricted in combating dismounted personnel.

(S) It has been reported that some tanks were resupplied by truck four or five times a day. These trucks were vulnerable to opposing tank and artillery fire, making resupply difficult and, in some cases, impossible. This problem was partially solved by employing the U.S. M-113 APC to carry ammunition to tanks at the front. The Israelis believe that main gun ammunition capacity should be at least 70 rounds and are designing their tank to have this capacity. U.S. Patton tanks and British Centurion tanks carry 63 and 70 main gun rounds, respectively, as compared to the 40 rounds that the Soviet T-62 main battle tank carries. The Israelis believe that, when the enemy has a numerical superiority in tanks, friendly tanks must carry a larger basic ammunition load because of an increased rate of fire and the resupply problem.

(S) About 40 percent of the combat vehicles engaged by Israeli tank main guns were at ranges over 2,000 meters.¹⁶ Maximum engagement ranges of 4,700 meters and 3,500 meters have been reported for tank operations in the Sinai and Golan Heights, respectively. Tank machine gun fire was primarily at short range and directed against infantry.

11. (S) The IDF Armor Questionnaire was administered to 889 Israeli tank and mechanical artillery personnel. Of the 660 tank personnel interviewed, approximately 9 out of 10 were tank commanders. See WSEG Report 237, *Data From the October 1973 Middle East War*, Volume III, "IDF Ground Forces," October/November 1974, SECRET NOFORN (Except Israel).

12. (U) WSEG Report 237, loc. cit.

13. (U) Ibid.

14. (S) Two-thousand flechette rounds were delivered after the war. Four hundred rounds were fired for training purposes; the remainder were distributed to tanks in service.

15. (U) WSEG Report 237, loc. cit.

16. (U) Ibid.

SECRET

SECRET

(S) About three-quarters of Israeli tank commanders surveyed said they estimated range before firing the first round.¹⁷ The Centurions have only a ranging machine gun, while the U.S. Patton tanks have coincidence rangefinders. About one-third of the Patton tankers surveyed never used their rangefinder, primarily because of short engagement range or lack of time.

(S) Two-thirds of the Israeli tank commanders surveyed had difficulty sensing hits due to dust or smoke, and four-fifths claimed their hits were nearly always sensed by other vehicles.

(S) About one-third had difficulty identifying friendly combat vehicles, and one-fifth were fired on by friendly ground forces. Colored panels provided to Israeli ground vehicles to permit them to be identified from the air were not generally used; only about one-tenth of the tank commanders surveyed employed them. However, flags, radios, flares, unit markings, panels, and combinations of these devices were used for self-identification. One-seventh of the tank commanders interviewed had been attacked by friendly aircraft.

Arab Tactics.¹⁸ (S) Arab armor, usually with some mechanized infantry support, attacked in column formations using standard Soviet battle drill with designated release points for battalions, companies, and platoons. Both Egyptian and Syrian armor attempted rigid textbook execution of this drill, apparently using guideline distances for the release points without any adjustment for terrain or circumstances. Arab tanks fired on the move during mass attacks and, as the battle closed, began to fire from the short halt, starting at about 1,800 meters. Once fully deployed, they usually attacked in successive waves—again, with little regard for terrain or circumstances. During Syrian tank attacks, mutual support tactics and movement by bounds to take advantage of terrain were seldom observed. It has been reported that those tanks not directly engaged “waited their turn” and did not provide a base of fire. In general, Arab tank gunnery was reported to be relatively poor in both accuracy and rate of fire when compared to Israeli tank gunnery.

(S) Egyptian tankers generally kept their hatches open during movement; both Egyptian and Syrian tankers buttoned up once engaged. Premature dismounting of mechanized infantry forced Arab tanks to slow the speed of assault to a walking pace, exposing the tanks further to Israeli fire. Arab attacks were generally preceded by artillery preparations and supported by continuous artillery fire forward of the attack line. This was sustained until attacking tanks were within 500 meters of their objective. Then, the artillery fire was shifted to Israeli rear areas.

(S) On the defensive, Egyptian armor made little effort to maneuver into flanking positions against Israeli forces. They employed terrain poorly. On the other hand, when Syrian armor was under attack, they often maneuvered to obtain flanking positions. They were reported to use terrain more effectively than the Egyptians by moving to defilade, coming up to fire, moving back out of sight, and then moving to a new position. Often the

17. (U) Ibid.

18. (U) The discussion of Arab armor employment is based on the

SECRET

SECRET

Syrian tanks were positioned in defensive blocking and ambush roles hidden by the terrain. There were instances when the Israelis were taken by surprise by such forces and suffered casualties.

(S) It was reported that about 400 Syrian tanks were abandoned by their crews during the war. This may have been caused by lack of fuel, lack of ammunition, personnel injuries, or fear.

b. Mechanized Infantry Vehicles

(S) Table 12 presents the characteristics of the primary Israeli and Arab mechanized infantry vehicles.

Israeli Vehicles. (S) The Israelis liked the mobility, reliability, and overhead protection of the U.S. M-113 armored personnel carrier (APC). However, they have indicated that an APC should have a greater fighting capability than the M-113. They would like to be able to fire from inside a mechanized infantry combat vehicle without exposing themselves. They further believe that an APC should have a 3,000-meter antipersonnel capability. They found the M-113 quite useful for ammunition resupply; trucks used for this purpose were frequently damaged by Arab artillery fire and, in general, had a poor off-road capability.

Table 12 (C). Mechanized Infantry Combat Vehicles

Characteristic/Item	M-113 APC (U.S.)	BTR-60PB (USSR)	BMP (USSR)
Weight (tons)	12.0	11.3	15.0
Horsepower	212	164	300
Fuel Type	diesel	gasoline	diesel
Standard Capacity (men)	9 (1 driver, 8 infantry)	12 (2 crew, 10 infantry)	11 (3 crew, 8 infantry)
Armor Type	aluminum	rolled steel	high strength steel and aluminum
Frontal Protection (inches of armor)	1.5	0.4	0.87
Overhead Protection	yes	yes	yes
Land Speed (mph)	40	50	43
Water Speed (mph)	3.6	6.2	4.5
Range (miles)	350	310	310
Firing Ports	none	none	8
Main Armament	50 caliber machine gun	14.5 mm machine gun	73 mm smoothbore gun w/automatic loader; SAGGER ATGM
Secondary Armament	none	7.62 mm machine gun	7.62 mm machine gun
Night Vision	active IR	active IR	passive IR (gunner) active IR (driver, commander)
Fording Depth	swims	swims	swims

Source: *Analysis of Combat Data in the 1973 Mid-East War, Final Report, Volume III, Special Readiness Group, U.S. Army Combined Arms Center, June 1974, UNCLASSIFIED.*

SECRET

SECRET

(S) In addition to 518 M-113s, the Israelis had almost 4,000 World War II halftracks in their prewar inventory. These vehicles could not match the mobility of their tanks and, because they had no overhead protection, were extremely vulnerable to Arab artillery fire.

Arab Vehicles. (S) The Arabs employed the BMP amphibious armored infantry combat vehicle in limited numbers. The BMP is reported to be the most modern infantry vehicle in the Soviet inventory. It is a tracked vehicle weighing 14.9 tons and having a low silhouette (6.24 feet). It carries a 73 mm smoothbore gun, four SAGGER antitank guided missiles (launched from a rail above the 73 mm gun), and a 7.62 mm coaxial machine gun. The 73 mm gun fires rocket-assisted HEAT and HE warheads using an automatic loading system with a 40-round capacity. Two SAGGERs are stowed in the turret and two in the right front of the squad compartment. A day/night periscope is provided for both the 73 mm gun and the coaxial machine gun. The troop compartment carries eight men, each of whom has a porthole from which to fire his rifle. The BMP has a closed environmental system that provides filtered air to both crew and troop compartments.

(S) The Arabs also employed the BTR-60PB APC, a wheeled vehicle powered by two 90-hp six-cylinder gasoline engines. The vehicle carries a turret-mounted 14.5 mm gun and a 7.62 mm machine gun. It has a crew of two and carries a 10-man infantry squad. The armor is thin—10 mm on the front slope, 6 mm on the sides, and 14 mm on the turret roof. Good documentation on this vehicle has been available for some time.

2. Antiarmor

(U) In the first phase of the October 1973 War, Israeli armor forces operating near the Suez Canal with little or no infantry and artillery support were reported to suffer a large number of losses to infantry antitank weapons while attempting to relieve the outposts along the Bar-Lev Line and contain the Egyptian advance. These losses prompted reports that antitank weapons brought to an end the primacy of the main battle tank in ground warfare. The antiarmor weapons employed by Israel and the Arabs are discussed below. Their main characteristics are summarized in Table 13.

a. Israeli Antiarmor Weapons

(S) As noted before, the principal antitank weapon used by the Israelis was the main battle tank. Israel claims that over 90 percent of Arab tank losses were caused by their tanks. Other antitank weapons available to the Israelis during the war were the 3.5-inch rocket launcher, the 106 mm recoilless rifle, captured RPGs, and the U.S. LAW (light antitank weapon). The Israelis received a total of 16,000 LAWs during the final stages of the war, and LAW was immediately put into service. Although some reports have indicated employment of the French SS-11 system, the Israelis state that it was not used during the war.¹⁹

19. (U) *WSEG DAT Report from Israel*, No. 81, March 1974, SECRET.

SECRET

SECRET*Table 13 (S). Infantry Antitank Weapons*

Type	Ballistic Projectile		Wire-Guided Missile	
	LAW (U.S.)	RPG-7V (USSR)	TOW (U.S.)	SAGGER (USSR)
Weight of Projectile/Missile (pounds)	2.25	5.5	40	24.9
Weight of Launcher/Ground-Launch System	4.7*	14.5	120	
Warhead Type	HEAT	HEAT	HEAT†	HEAT
Minimum Effective Range (meters)	0	0	65	500‡
Maximum Effective Range (meters)	140	300§	3,000	3,000□
Flight Time to Maximum Effective Range (seconds)	N/A	N/A	14.8	26.5
Maximum Speed (meters/second)	145	300	N/A	N/A
Night Sight	no	yes	no	no
Armor Penetration at Zero-Degree Obliquity (inches)	12.2	10.4	22.4	14.0-16.0
Remote Firing Capability	no	no	no	yes
Tracking System	N/A	N/A	optical	visual
Guidance	N/A	N/A	automatic	manual

*Combined weight of projectile and launcher.

†As a crew safety factor, the TOW missile coasts for a short period of time after launch before the second rocket motor is fired. The second firing imparts the velocity necessary to speed the missile to the target. The TOW missile is aerodynamically controlled.

‡SAGGER is not effective under 500 meters because of the arming and fuzing procedure employed.

§The performance of RPG-7V is significantly degraded by crosswinds.

□SAGGER is thrust-vector controlled and is therefore uncontrollable after the end of powered flight. The SAGGER spool contains 3,100 meters of wire.

HEAT—High-Explosive Anti-Tank; N/A—Not applicable.

(S) During the last phase of the war, the Israelis were furnished with 81 U.S. TOW (tube-launched, optically tracked, wire-guided) missile launchers, 2,000 TOW missiles, and 3 TOW training sets. Three hundred thirty missiles were reported to have been fired for crew training and purposes of demonstration, but the weapon was not used in combat prior to the cease-fire.²⁰ Although the Israelis generally praised the TOW system, they were critical

20. (S) After the cease-fire, it was reported that 20 missiles were fired against Arab targets at ranges of 2,000 to 2,500 meters. These firings resulted in 13 hits (9 tanks, 2 tracked supply vehicles, 1 armored tractor, and 1 truck). At least three of the misses were due to crew errors rather than to deficiencies of the system.

SECRET

SECRET

of its lack of (1) a night sight,²¹ (2) a remote firing capability, and (3) armor protection for the gunner. The IDF prefers to fire TOW from a mobile platform and plans to mount TOW launchers on modified M-113 APCs. Israel will have 320 TOW launchers by 1976 and 10,000 TOW missiles by 1979. Initially, the IDF plans to have a TOW company (12 TOWs) in each brigade and to include TOWs in the reconnaissance battalion of each division. Subsequently, they will have a TOW company for each battalion.

(S) The Israelis believe that LAW is accurate at close range, but they feel that its effective range is too short for desert operations.²² In addition, they criticize the discomfort in carrying it; the excessive pressure required to activate its firing mechanism, causing the weapon to jump and produce misses; the oversized rear sight aperture; the position of the rear sight on the shoulder piece; and the discomfort in operating the safety catch. There were reports that LAW ammunition failed to explode or penetrate; the Israeli Ministry of Defense confirmed some of these failures.²³ IDF LAW training occurred during the war and was very limited. Postwar training has apparently improved Israeli confidence in LAW. They have requested 50,000 LAWs, which they will receive by November 1975.

b. Arab Antiarmor Weapons

(S) The Arabs employed the RPG-7V (rocket-propelled grenade), the AT-3 SAGGER antitank missile system, the BRDM-2/SAGGER vehicle, and numerous antitank guns in addition to Soviet T-34, -54, -55, and -62 main battle tanks. Based on experience in using both LAWs and captured RPG-7Vs, the Israelis find the RPG-7V to be more rugged, reliable, and easier to carry in large numbers than LAW. The RPG-7 has separate ammunition, and several rounds may be carried with each launcher. LAW is a "throw-away" weapon—it can be used only once. Also, the RPG-7 has an attachable night sight.

(S) Like the U.S. TOW, SAGGER does not have a night sight. Both have a maximum effective range of about 3,000 meters. However, TOW is almost twice as fast as SAGGER, traveling 3,000 meters in 14.8 seconds as opposed to 26.5 seconds for SAGGER. SAGGER may be fired remotely from a distance of up to 80 meters; TOW does not have a remote firing capability. The SAGGER launcher has a periscope; the TOW launcher does not. However, the TOW guidance procedure is simpler than the SAGGER procedure. The TOW does not require as much training and is more accurate. The TOW gunner merely places the

21. (S) The "ten-dollar night sight for the TOW weapon system" reported to have been developed by the Israelis was, in fact, a \$1,400 pair of Israeli-produced infrared goggles secured to the TOW sight by a \$25 adapter. In order for the goggles to work, the target must be using active IR illumination or be illuminated by active IR. The Israelis discovered, during testing, that the TOW flare and target IR spectra overlapped and saturated the goggles. This night vision modification of the TOW was never issued.

22. (S) Of 17 confirmed LAW firings under combat conditions, eight of the targets hit were at ranges under 100 meters; the ninth target hit was at 400 meters. The effects of these hits are not known.

23. (S) At the request of the WSEG Data Acquisition Team, the IDF test fired LAW Lot LS-218-SR. Seven of the 40 rounds fired from a range of 50 meters at a perpendicular armor plate 150 mm thick either failed to function, had low-order detonations without penetration, or had partial penetration (50 mm). All failures were attributed to fuze malfunction. The lot was accepted for training only.

SECRET

SECRET

cross-hairs of his optical sight on the target and maintains them there during the flight of the missile. The SAGGER gunner must fly the missile to the target; he must actively track both the missile and the target.

(S) The BRDM-2/SAGGER is a BRDM-2 vehicle modified to accommodate the SAGGER antitank guided missile. This wheeled vehicle has a two-man crew—the driver and the gunner. Six launch rails are mounted on a hydraulically operated centerpost that can be raised, lowered, tilted in elevation, and aligned in azimuth. The missile gunner sits at the right front of the vehicle and has a periscope sight, missile control box, foot pedals for missile launcher traverse, and two checkout panels. The periscope is fixed in position and is protected by armor covers that swing away. The gunner can dismount and fire missiles from up to 80 meters away. The basic load of missiles is six on launch rails and eight in racks below the rails. It takes approximately 15 to 19 seconds to raise the launcher to a firing position.

c. Interaction of Israeli Tanks With Arab Antitank Weapons

(S) Israel was well informed about the SAGGER missile and other Soviet antitank weapons and knew that the Russians were training the Arabs in their use.²⁴ Arab SAGGER units were deployed by the infantry, with eight missiles per launcher instead of the usual four. Both ground- and armored-combat-vehicle-mounted SAGGERS were employed. In the majority of cases, missiles were fired from the ground and from prepared positions.

(S) The Israelis were surprised by the quantity of antitank weapons employed by the Arabs, particularly the number and density of RPG-7Vs and SAGGERS employed by infantry during the Egyptian advance. The Israelis estimate that 6,000 to 8,000 SAGGERS were fired by Arab forces during the war.²⁵ According to the WSEG Armor Questionnaire, Israeli tank commanders reported that an average of five missiles were fired at them during the war; one-third of these firings were "salvos" involving more than one missile. Israeli tank forces did not do well against the Egyptian infantry in the first few days of the war. Israeli tanks had no antipersonnel main gun rounds, and the Egyptians had greatly increased the density of antitank weapons in their infantry units.²⁶ Without infantry and artillery support to suppress Arab antitank gunners, Israeli tanks suffered many losses. Early in the war, General Adan's Sinai Division penetrated the Egyptian 2nd Army to within 1 or 2 km

24. (S) SAGGER crew members and RPG-7V gunners were selected on the basis of superior ability and education. A larger fraction of this force had completed secondary school than had any other infantry element. SAGGER gunners are reported to have received 3 months of intensive instruction after completing basic training. They made between 1,000 and 1,800 simulated firings during training before their first actual firing. During the war, gunners maintained their proficiency by simulating 20 to 30 practice firings per day. Simulator vehicles were found as close as 200 meters behind defensive positions on the west bank of the Suez Canal.

25. (S) In the WSEG Armor Questionnaire, Israeli tank commanders reported that the average SAGGER firing ranges were about 1,500 or 2,000 meters, depending on whether IDF units were in an attack or defend/delay posture.

26. (S) In the 1967 Six-Day War, the Arab infantry was unable to withstand Israeli tank attacks, and the Arab tankers were no match for Israeli tank gunnery. Since they believed that they could not achieve tank superiority, in a qualitative sense, over Israel, Arab infantry units were saturated with antitank weapons.

SECRET

SECRET

of the Suez Canal. Large numbers of SAGGERs were fired from fortified positions on the west bank of the Canal.²⁷ It is reported that the Israelis lost 45 of their tanks during this battle. In this instance, the shock effect on the tank crews may have been as great as the material damage sustained.

(S) Reported estimates of SAGGER impacts on Israeli tanks vary between 1 and 25 percent of all impacts sustained. The only confirmed report of Israeli tanks lost to SAGGERs is from the Combat Vehicle Assessment Team (CVAT). Of 119 Israeli tanks examined, 11 were found to have been impacted by SAGGER and other antitank munitions (8 of which were impacted and killed by SAGGER only), and 18 others were impacted by HEAT munitions of unknown type. The percentage of tanks that could have been killed by SAGGER missiles in this sample ranges from 6.7 to 24.3 percent. Tank commanders responding to the IDF Armor Questionnaire reported that about 40 percent of all catastrophic impacts²⁸ on their tanks were due to Arab missiles.²⁹ Seventy percent of the armor personnel questioned in this survey were in the Sinai during the war, and it has been reported that on the order of 200 Israeli tanks were in Egyptian-held territory at the end of the war (for the most part since the early days of the war). Therefore, these estimates may not be contradictory; they may be based on two different samples. The Arabs also had antitank guns, recoilless rifles, and tanks that could have destroyed some of these 200 tanks.

(S) It has been widely reported that Israeli armor losses to Egyptian antitank weapons were significantly reduced after the first few days of the war. This occurred when the Israeli Sinai forces achieved a more balanced force of combined armor, artillery, and infantry. In addition, the Israelis credit a number of other factors with contributing to this reduction in losses. Countermeasures to SAGGER were developed. As incoming SAGGERs were detected, suspected locations of gunners were taken under fire to distract them.³⁰ If time permitted, the tanks attempted to maneuver to break the gunner's line-of-sight or evade the missile by executing sharp turning movements.³¹ A few tank commanders found smoke to be an effective countermeasure to SAGGER. It was usually generated by IDF artillery rather than by the tanks.

(S) Many Israelis believe that the U.S. 105 mm BEEHIVE tank round should be effective against antitank gunners.

27. (C) It was during this engagement that the IDF first learned that these fortifications were SAGGER firing platforms.

28. (U) A *catastrophic impact* was an impact that caused the abandonment, burning, or explosion of a tank.

29. (U) In general, under combat conditions, it would be difficult for a tank commander inside his tank to distinguish the nature of the weapon impacting his tank.

30. (S) The average range recorded for firing against suspected positions was about 1,700 meters; in some cases, firing ranges were over 4,000 meters.

31. (S) Eighty percent of the respondents in the WSEG Armor Questionnaire said evasive maneuvers were effective.

SECRET

SECRET**3. Artillery³²**

(S) Israeli success in the 1967 Six-Day War, combined with their limited resources, caused them to emphasize armor and airpower at the expense of artillery and other elements. On the other hand, the Arabs spent considerable effort upgrading their artillery. This difference in emphasis was reflected during the October 1973 War.

(S) Egypt and Syria used Soviet-built artillery and had about a 2.5:1 prewar advantage over the Israelis (Table 14). With the exception of heavy mortars, most Israeli artillery was U.S. manufactured. Characteristics of the artillery types of U.S. and Soviet origin are shown in Table 15.

(S) Arab use of artillery suggests that the Arab/Israeli ammunition ratio was even greater than the 2.5:1 tube ratio. It is estimated that, in the first hour of the October 1973 War, Egyptian artillery expended 100,000 rounds, or about 30 percent of the total number fired by Israel during the entire war. In addition, Egypt claims to have fired a million rounds during the entire war, which is about three times the amount fired by Israel against Egypt and Syria combined.

(C) Arab artillery placed massive concentrations on Israeli objectives to protect advancing ground units. However, in some instances, Arab attacks were conducted against Israeli positions with little or no artillery support. The Arabs were able to mount a considerable counterbattery effort, which limited the effect of Israeli artillery by discouraging gun registration, inflicting personnel casualties, and causing guns to relocate (see subsection b below).

(C) In contrast, Israeli artillery units, which were short of tubes (mainly the U.S. M-107 175 mm gun) and especially ammunition, were severely strained when they were called on in the early part of the war to provide the fire support that the Israeli Air Force had been expected to supply (but could not, due to the effectiveness of Arab air defenses). In some cases, Israeli artillery units were given 150 percent of their normal daily allocation and still needed more ammunition. Some of the problems precipitated by the shortage of Israeli artillery ammunition were:

- (1) Requested missions were frequently not fired due to a shortage of HE projectiles, variable time fuzes, and propellants.
- (2) Heavy demand for artillery support frequently led to guns being fired at rates

32. (U) The first two references listed below were the primary sources used for the artillery section; the remaining sources were used to a lesser extent. In cases where data appeared in both a primary and secondary source and were contradictory, the primary source was used:

- a. WSEG Report 237, loc. cit.
- b. *Visit to Israel, 5-22 May 1974, Trip Report*, Dr. Joseph Sperrazza et al., 11 June 1974, CONFIDENTIAL.
- c. Talbott Report: *Visit of LTG Orwin C. Talbott, Deputy Commanding General, USA Training and Doctrine Command, to Israel, 31 January-12 February 1974*, DOA, TRADOC, ATCS-40046, 27 February 1974, SECRET NOFORN (Except Israel).
- d. CACDA Report, op. cit., Volume III, "Ground Operations."
- e. DIA Intelligence Team Report, op. cit.
- f. Hennessey Report, op. cit.

SECRET

SECRET

Table 14 (S). Prewar Artillery Inventories of Israel, Egypt, and Syria

<i>Artillery</i>	<i>Israel</i>	<i>Egypt</i>	<i>Syria</i>	<i>Arab:Israeli Ratio</i>
Heavy Mortars (≥ 120 mm) *	415	354	294	1.6:1
Guns and Howitzers	412	872	465	3.2:1
Multiple Rocket Launchers	<u>very few</u>	<u>72</u>	<u>20</u>	<u>92: few</u>
	~827	1,298	779	2.5:1~

*All combatants employed heavy mortars with field artillery.

Table 15 (S). Comparison of Principal U.S. and Soviet Artillery Employed in War

<i>Weapon</i>	<i>Max. Range (km)</i>	<i>Projectile Weight (lb)</i>	<i>Rate of Fire—Max./Sustained* (rds/min)</i>
U.S.			
155 mm Howitzer	14.6†	103.4	4.0/1.0
175 mm Gun	32.7	147.4	1.5/0.5
USSR			
122 mm Howitzer	15.3	48.0	8.0/2.3
130 mm Gun	27.0	73.5	7.5/2.3
152 mm Gun/Howitzer	18.5	95.9	4.0/2.0
180 mm Gun	30.4‡	189.6	1.5/0.5
120 mm Mortar	5.7	33.9	15.0/1.7
160 mm Mortar	8.0	91.3	3.0/?
240 mm Mortar	9.7	288.2	1.0/1.0
122 mm Multiple Rocket Launcher	20.5	41.8	40.0§/4.0

*Sustained for ½-hour period.

†19.4 with Rocket-Assisted Projectile (RAP) round.

‡43.7 with RAP round.

§This weapon is capable of launching its 40 rockets in 20 seconds. However, its long reload time limits its sustained (½ hour) rate of fire to about four rounds per minute.

SECRET

SECRET

higher than those recommended.³³ This contributed to excessive tube wear and increased rate of mechanical failure.³⁴

- (3) The effectiveness of counterbattery fire was constrained by the shortage of ammunition.

(S) Difficulties caused by artillery materiel shortages were compounded by training deficiencies and shortages of trained forward observers. More than 75 percent of the troops assigned to Israeli artillery units were reservists. Many had forgotten proper artillery procedures, and several days during one of the most crucial parts of the war were required to relearn them. The shortage of trained forward observers meant that supported units sometimes had to adjust the artillery fire themselves.³⁵ In general, non-Artillery Corps officers were not familiar enough with artillery procedures to do this effectively, and problems were experienced such as poor precision of adjustment, wasted ammunition, and misallocation of fire.

a. Artillery Against Infantry and Armor

(S) Artillery was highly effective against soft targets and performed the useful function of degrading the ability of infantry and armor to perform their functions. About a third of the Israeli casualties examined in a survey of 2,900 wounded were caused by Arab artillery fire. Fifteen percent of these casualties (5 percent of the sample) were tank crewmen, but since it is not known if they were in their tanks at the time of injury, this statistic cannot be used to analyze the effect of artillery against armor.

(C) The Egyptians and Syrians were reported to have used only point detonating (PD) fuzes. The Israelis used mainly PD fuzes because of a shortage of variable time (VT) fuzes. It was reported that PD-fuzed rounds were ineffective in sand. Investigation by the Army Materiel Systems Analysis Agency (AMSAA), however, showed that rounds set for super quick (SQ) detonation should not be significantly degraded by sand. Subsequent conversations between AMSAA and Israeli artillery representatives indicated that Israeli forward observers may have misjudged the effect of artillery impacting in sand. In any event, use of VT fuzes with HE rounds in most circumstances can be expected to increase the casualty-producing potential over SQ-fuzed rounds by up to 20 percent against standing

33. (U) Results of the IDF Artillery Questionnaire suggest that these high rates of fire were not always justified and that poor training was partially responsible.

34. (S) Tube wear causes loss of muzzle velocity. This should have been taken into account, but the Israelis had no satisfactory devices for measuring muzzle velocity. Another solution would have been to register guns individually, but many commanders preferred to save ammunition for combat. Thus, Israeli batteries tended to lose precision as the war continued.

35. (S) According to the WSEG Artillery Questionnaire (WSEG Report 237, loc. cit.), about 15 percent of artillery fire was directed by supported units. About 80 percent of the targets fired on were acquired by forward observers, who adjusted fire on most of them. The abundance of targets and limited artillery resources precluded the need for much unobserved fire, which often was not possible because gun muzzle velocity measurements were not generally available.

SECRET

SECRET

troops and on the order of 100 percent against prone personnel.³⁶

(S) In addition to the casualties produced, artillery fire had the important effect of suppressing fire from exposed troops. The Israelis felt that their artillery was very effective in suppressing SAGGER fire from Arab infantry, and they even used long-range artillery to suppress Arab air defenses (HE was fired against personnel and chaff against radar).

(S) It is difficult to assess the effectiveness of artillery in terms of damaged and destroyed tanks. The CVAT examined 554 damaged Arab and Israeli tanks and found that less than 1 percent of the impacts were made by artillery. On the other hand, a survey of IDF tankers from 330 tanks indicated that 25 percent of the hits they received came from artillery,³⁷ and about 6 percent of the artillery hits caused catastrophic damage. The tanks involved were not available for inspection.

(S) It is difficult to reconcile the difference in IDF tanks hit by artillery in these two samples, since little is known about the circumstances under which the tanks were damaged. A direct hit is usually necessary to substantially damage a tank with artillery fire, and such a hit is difficult to achieve. There were occasions when the Arabs delivered massive concentrations of artillery fire, and this may have resulted in some direct hits on tanks.

(S) There were reports that Israeli artillery sometimes ignited the external fuel tanks on Soviet-built vehicles. There is no evidence that this happened often or that vehicles were disabled when it did occur.

b. Counterbattery

(S) The Arabs were able to devote a considerable amount of resources to the counterbattery role; they frequently used 18 guns to cover an area 400 meters by 500 meters. The Israelis often received counterbattery fire from 20 minutes to an hour after they occupied a position. This caused the Israelis to frequently change positions and discouraged them from registering their guns. This experience gave the Israelis an appreciation for the mobility and overhead protection of their U.S. 155 mm self-propelled artillery. Nonetheless, Israeli artillery troops suffered 194 killed and 980 wounded.³⁸ Soldiers interviewed in the WSEG Artillery Questionnaire felt that 80 percent of Israeli artillery casualties were due to Arab counterbattery.

(S) The IDF initially thought that the Arabs were using flash and sound ranging, as well as radio and radar direction finding, to locate Israeli batteries. It was later suspected that the Arabs were relying more on monitoring Israeli radio messages, using forward observers inserted behind Israeli lines, or basing counterbattery fire on likely Israeli positions dictated by the terrain. Successful employment of the latter method was made easier

36. (U) *Effectiveness Data for Howitzer, 155 mm: M-109*, USA Ballistic Research Laboratories, Aberdeen Proving Ground, 19 October 1970, CONFIDENTIAL.

37. (U) It is not always easy for a tank crewman to identify the type of munition that hit his tank.

38. (S) Total Israeli casualties were 2,266 killed (through 13 January) and 6,792 wounded.

SECRET

SECRET

for the Arabs since Israeli batteries often had to stay near roads because their ammunition carriers could not negotiate sand or rocky terrain. On some occasions, when the Israelis put their batteries a safe distance from the position they would normally choose to set up on, counterbattery fire would come in on the location they avoided.

(S) During the first days of the war, the Israelis found that Arab guns—most of which offered little troop protection—would remain quiet for a long time after being engaged by counterbattery fire. Eventually the Arabs learned that the Israelis could not allocate sufficient rounds to cause significant damage and would resume firing after only a few minutes. The Israelis located most Arab positions by visual observation.

(S) The Israelis were also at a disadvantage in counterbattery exchanges due to their shortage of longer range weapons. Tables 7 and 9 show that the Arabs had about 300 medium-range guns, while the Israelis had about 76 medium- to long-range guns (130 mm and 175 mm). The Israelis had nothing that could equal the 40-km range of the Soviet 180 mm gun firing a Rocket-Assisted Projectile (RAP). It is doubtful, however, that this weapon made much of a contribution due to the small number in Arab hands (about eight total) and the large inherent dispersion of the rounds.

(S) Another technique used by the Arabs to neutralize the effect of Israeli guns was camouflage and deception.³⁹ By camouflaging true targets and creating false ones, the Arabs sometimes deceived the Israelis into wasting ammunition. Egyptian efforts are reported to have been guided by a well-integrated camouflage and deception plan. Equipment was dug in and placed under camouflage nets with sand-colored garnish. Radio trucks were concealed by screens painted to look like desert huts. Both the Egyptians and Syrians used dummy artillery pieces made from wood and sheet metal (Syrian dummy battery positions included one real artillery piece);⁴⁰ these positions sometimes included sound and flash simulations and false radio signals. When these positions drew Israeli counterbattery fire, oil drums were ignited to give the impression that damage had been sustained.

(S) The Israelis made some efforts at camouflage, but they were not very effective, and there is no indication that dummy artillery was employed.

c. Rockets

(S) The Arabs employed rockets (especially the 122 mm 40-round multiple rocket launcher used by the Egyptians) extensively during the war. On one occasion the Israelis reported suffering 23 to 28 casualties and losing 3 cannons in a 122 mm rocket salvo. On another occasion, an entire 175 mm battery was knocked out by a rocket salvo. Successes such as these led one Israeli commander to claim that the 122 mm rocket was the Arabs' most successful weapon. There is no evidence available, however, to support this contention.

39. (S) Israel estimated that 25 percent of Arab artillery sites contained dummy equipment.

40. (S) Dummy equipment was so realistic that ground level observers reported difficulty differentiating between real and dummy equipment from as close as 20 feet.

SECRET

SECRET

It appears that a few spectacular successes, combined with the psychological effect on those who witnessed attacks by large volumes of rockets, created an exaggerated impression of this weapon's importance.

(S) It is difficult to deny the usefulness of rockets, however, in certain situations requiring a high rate of fire. The Israelis were impressed by the difficulty they had delivering large amounts of fire, not only because of their shortage of artillery and ammunition, but also because their rate of fire was often constrained by effective Arab counterbattery fire. Accordingly, the Israelis have expressed an interest in developing a 20-km rocket, and they are developing and fielding a 40-km rocket.

4. Infantry Special Forces

a. Israeli Forces

(S) Israeli infantry paratroops were used for special operations. There were nine infantry paratroop brigades (27 battalions), which consisted mainly of troops who were young, regular army, and well trained. This is in contrast to the mechanized infantry troops organic to armor units, who were generally older, reservist, and not as well trained (the armored branch being more occupied with training tank crews). The poor performance of organic mechanized infantry troops when fighting in a dismounted role resulted in many tank commanders asking for infantry paratroops. Since the war, all infantry have been combined under the Chief of Infantry and will be trained to fight in both mounted and dismounted postures.

(S) The infantry paratroops conducted a number of special operations. One of the most significant was the recapture of Mt. Hermon on October 22. Thirty helicopter sorties were used to land two Israeli battalions. Only 2 hours after the force was landed, they captured the main Syrian position and two outposts, with only three Israelis reported wounded.

b. Arab Forces

(S) Egyptian rangers, who were carefully selected and highly trained, were employed for attacks in Israeli rear areas. About 12 of 24 available battalions of rangers were used in the war. In the initial canal crossing by the Egyptians, rangers crossed with the first wave of infantry. The rangers assisted in building the bridgehead by setting up ambushes, laying mines, cutting lines of communication, and protecting boundaries between infantry brigades. Using RPG-7s and SAGGERS, the rangers ambushed Israeli armor (traveling without infantry or artillery support) attempting to relieve the Bar Lev Line. Other operations were attempted and the Egyptians claim significant successes, but no records or data are available.

(S) Several Egyptian heliborne operations were conducted, and one—an ambush of an Israeli tank unit—was partially successful. The IDF claims to have shot down 30 helicopters attempting to insert Egyptian rangers behind Israeli lines on the first day of the war (Egypt acknowledges four); the Israelis destroyed most of the other ranger units that landed because the units remained isolated from one another.

SECRET

SECRET

(S) The Syrians had six special force battalions—one airborne (helicopter) and five commando. Apparently only the airborne and two commando battalions were used. Their only known success occurred on 6 October, when soldiers brought in on foot and in helicopters captured the Israeli position on Mt. Hermon. The Israelis recaptured the position on 22 October, after two previously unsuccessful attempts.

5. Night Operations

(U) The importance of combat operations at night is likely to increase as night vision devices are improved. The October 1973 War provides an opportunity to examine several such operations.

a. Israeli Equipment and Operations

(S) During night operations, the Israelis had to employ mortar and artillery illuminating rounds and flares. They considered their forces inadequately equipped in both quantity and quality of night vision devices. The U.K. Centurion main battle tank, which composed about half of the Israeli tank inventory, did not have an infrared (IR) system. The U.S. Patton tanks have IR vision devices for the commander, gunner, and driver. However, these devices work only in conjunction with the IR searchlight or driving lights. Many tankers, both Israeli and U.S., believe that they become easy targets when these lights are turned on. Few Israeli tankers used their searchlights.⁴¹ When asked about starlight scopes, only 5 of 890 men surveyed in the IDF Armor Questionnaire reported the possession of such a device.

(S) Two significant night operations were conducted by the Israelis: the operation at Tel Shams⁴² in the Golan Heights on 13 October and the crossing operation at the Suez Canal on 15-16 October. At Tel Shams the Israelis made repeated attempts with armor to seize a dominating hill position. These attempts failed due to the tenacious resistance of the Syrian infantry. Finally, an Israeli airborne unit supported by three artillery battalions and tanks successfully attacked and secured this position at night. The crossing operation at the Suez Canal included the Battle of the Chinese Farm,⁴³ which was the largest tank battle of the war. General Sharon's 1st Armored Brigade (about 130 tanks) collided head-on with about 326 tanks of the Egyptian II Corps armor force. The battlefield was 8 square kilometers—2 km east and west by 4 km north and south. The forces quickly became intermingled, and tank duels were fought at ranges from 20 to 400 meters. The battle can only be described as a shootout, with the fastest and truest guns winning. The Egyptians are reported to have had SAGGER crews deployed among their armor, but they were not effective in the dark. The night vision devices in the T-62 tanks did not give the Egyptians

41. (U) WSEG Report 237, loc. cit.

42. (U) DIA Lessons Learned Report, op. cit.

43. (U) The description that follows is based on the Marshall Report, op. cit.

SECRET

SECRET

an advantage because the battlefield was illuminated by the light from burning tanks and Egyptian rockets. The battle ended several hours before dawn on 16 October, with 51 Israeli tanks and 160 Egyptian tanks reported lost.

b. Arab Equipment and Operations

(S) Arab forces were well equipped for night operations. Ground forces possessed a variety of night vision devices for use as driving aids (IR goggles) and for target detection and weapon sighting for individual, crew-served, and tank main-armament weapons. The Soviet T-62 tanks, like the U.S. Patton tanks, had only active IR devices; however, the BMP infantry combat vehicle had passive image intensification equipment. The RPG-7V was reported to have a night sight with four-power magnification, which made it possible to detect tanks at ranges up to 700 meters.

(S) Initial testing of captured Soviet night vision equipment indicates that it is comparable to first-generation U.S. equipment. For example, Soviet night sights have a tendency to "bloom" when exposed to sudden flashes of light. This deficiency, which has been corrected in U.S. equipment, was caused primarily by the particular image intensification tubes used in their construction.

(S) In general, Arab ground forces did not take advantage of their night vision capability by conducting night attacks or continuous combat operations. Their unit night operations consisted primarily of movement of forces, entrenchment, and preparation for attack. It is reported that Egyptian forward observer teams were sent behind Israeli lines at night. Most Israeli tank and mechanized infantry commanders said they were fired on at night by Arab artillery and tanks.⁴⁴

(U) The wide variety of Soviet-designed night vision equipment employed by the Arabs indicates that the Soviets continue to emphasize night operations.

6. Physical Barriers

(U) The Suez Canal and the Golan Heights were considered by the belligerents to be natural, defended barriers that would be costly in human and materiel resources to overcome. Historically, natural barriers are viewed as complicating an attack because they constrain the attacker with respect to the deployment of his forces, limit the maneuverability of her personnel and combat equipment, and slow his initial forward progress. These obstacles may allow the defender to economize on men and weapons and hold a broader front with smaller forces. However, as will be shown below, barriers provide an effective local defense only when kept under permanent surveillance and covered by fire.

a. Egyptian Crossing of the Suez Canal

(S) The crossing of the Suez Canal by Egyptian ground forces was accomplished with only minor difficulty. Although the Egyptians were prepared to accept up to 30,000

44. (U) WSEG Report 237, loc. cit.

SECRET

SECRET

casualties, they suffered only 170 killed or wounded in action during the initial crossing.⁴⁵ Israel had assumed that its embankment along the Canal would require 24 to 48 hours to breach. By dawn of 7 October, Egypt had 10 operational bridges across the Canal and 50 motorized ferries operational under the protection of over 50 SAM (SA-2, -3, and -6) batteries.

(S) Israel had prepared a series of strongpoints along the Canal, 15 of which were occupied on 6 October. Minefields were prepared around and between the strongpoints, and soft sand/clay barriers 10 to 20 meters high were built along the bridgeable length of the Canal to hamper crossing operations. In addition, gasoline-diesel fuel systems were developed before the war to set the surface of the Canal on fire during an Egyptian crossing.⁴⁶ Each system was to be emplaced along probable crossing points of the Canal. Due to the high cost, only two systems were installed—one at Firdan and the other at Dewar-Suar. Fifteen dummy systems were also installed. Neither operational system was used: the Firdan strongpoint was overrun before the system could be activated, and there was no Egyptian crossing at Dewar-Suar. Captured intelligence reports show that the Egyptians examined the dummy systems prior to the assault crossings.

(S) The Egyptians had conducted extensive field exercises and rehearsals in preparation for the canal crossing. They gained access to the Canal through 3-meter-wide "cutouts" in the west embankment, which were prepared in advance. The steep embankments prevented the Egyptians from "swimming" any of their amphibious vehicles. They used high-pressure water jets to make 60 gaps in the east bank sand barriers. These were breached in 2 to 5 hours. Infantry battalions crossed the Canal in four waves. Within 2 hours, transport ferries were in operation; these were soon followed by bridges. Soviet engineering equipment was used extensively and functioned well.

(S) However, contrary to Soviet doctrine—which stresses rapid movement, deep penetration, and continuous exploitation by tank-heavy forces—the Egyptians failed to exploit their initial success by concentrating on the continued expansion of their bridgehead and establishing defensive positions in the Sinai. Rather than continue the momentum of their attack against relatively light Israeli defenses, the Egyptian Army entrenched. Had the Egyptians employed their armor and mechanized infantry in a concentrated drive for the Sinai passes soon after securing their bridgehead, the still mobilizing and deploying Israelis would have been hard pressed to stop them.

b. Syrian Coordinated Attack in the Golan Heights

(S) On the Syrian front, the Israelis had prepared 12 strongpoints on key high terrain points, as well as an antitank ditch with a minefield approximately 100 to 150 meters in depth. The Syrians employed Soviet armored-vehicle-launched bridges to cross the ditch and

45. (U) Hennessey Report, *op. cit.*

46. (U) WSEG Report 237, *loc. cit.*

SECRET

SECRET

T-55 tanks with mine rollers to clear lanes through the minefields. It has been reported that few vehicles were destroyed in breaching the minefield, and any delay was slight.

(S) In accordance with Soviet doctrine, the Syrians committed armored forces through the breached minefields to conduct deep penetrations and bypass strongpoints of resistance. Contrary to Soviet doctrine, however, succeeding echelons did not neutralize the bypassed points of resistance, and these Israeli elements were able to continue effective operations in the Syrian rear area until the Syrians were pushed back by mobilized Israeli forces.

c. Israeli Crossing of the Suez Canal

(S) Unlike the well-planned Egyptian crossing of the Suez Canal, the Israeli crossing was a hasty one conducted on the march. The Israeli force advanced along the southern flank of the Egyptian 2nd Army, with the Great Bitter Lake providing a secure left flank. One Israeli armored brigade attacked the 2nd Army's southern flank as a diversion, while another armored brigade secured the narrow corridor to the Canal at the northern end of Great Bitter Lake. An airborne brigade then passed through the armored brigade and made the crossing in rubber boats. It appears that the Egyptians did not discover the paratroops until they had fanned out on the west bank and had successfully attacked Egyptian positions from the rear. At this point, the Israeli units were brought under heavy and continuous artillery fire, which lasted the rest of the operation. The attack into the 2nd Army's flank was successful though costly in Israeli armor.

(S) The first Israeli bridge across the Canal was completed on 16 October. During the 4½ days of bridging and rafting, 35 Israeli engineers were killed and 150 were wounded—as many as all initial casualties for the Egyptian crossing.

7. Chemical-Biological-Radiological Equipment⁴⁷

a. Israeli Equipment

(S) There are no indications that either side employed CBR weapons during the war.

[REDACTED] No U.S. toxic agents or munitions were provided to Israel.

b. Arab Equipment

(S) Both Egypt and Syria have a chemical force structure beginning with a chemical warfare directorate at the highest level and extending down to a chemical staff specialist at the company level. Specific chemical defense units are assigned to tactical units down to the regiment. Captured Arab CBR defense equipment was technically sophisticated, readily available, and found in large variety. The following equipment was standard issue to all front line ground troops:

47. (U) This material is based on discussions presented in the CACDA Report, op. cit., Volume III, "Ground Operations."

SECRET

25X6

SECRET

- (1) Soviet ShM CBR protective masks.
- (2) Soviet ShR protective masks for personnel with head or facial wounds.
- (3) K-type protective masks with a diaphragm for voice communication; to be used by commanders and signal personnel.
- (4) Soviet L-1 lightweight, rubberized fabric CBR protective suits for ground forces.
- (5) Antidotes for treating nerve agent poisoning.

All vehicles had decontamination kits and radiological warning devices. Companies were issued manually operated chemical agent detector kits that will detect U.S. chemical warfare agents. The Arabs also possessed the following previously unexploited items:

- (1) Automatic atropine-oxime injectors that reportedly contain an additional antidote for DG poisoning.
- (2) A version of the ShM CBR protective mask with a modified canister that screws directly to the mask and has an attached vulcanized shoulder and chest cover.
- (3) The GSP-1 and GSP-1M automatic CW agent and radiation detector alarm.
- (4) A battery-powered version of the VPKhR and the NNC 253T radiac meter.
- (5) The BMP-A version of the BMP infantry combat vehicle, which has a collective protective CBR system consisting of a central filter unit and outlets.

(S) The presence of protective masks, clothing, and decontamination equipment gave the Arabs a capability to fight in contaminated areas and under aerial spray attack. The presence of APCs with positive pressure collective protection provides a capability to exploit chemical attacks by immediate follow-up and to cross contaminated areas without resorting to individual protection.

(S) Most of the items provided to the Arabs are current Soviet equipment and suggest a considerable preparation for operations in a CBR environment. The quantity and quality of this equipment supports the Soviet emphasis on CBR preparedness and chemical warfare readiness. It is believed that the Soviet Union is better prepared to conduct chemical warfare than any other nation in the world. U.S. armed forces have placed less emphasis on CBR preparedness. This is reflected in a limited chemical deterrent-retaliatory capability and CBR defense capability.

8. **Electronic Warfare**

(S) The use of electronic warfare in the ground war involved active jamming and passive exploitation of communications links. The Egyptian efforts in this area reflected a significant improvement in capabilities since the 1967 conflict. Not only did the Egyptians use active jamming and imitative communications deception, but they also intercepted communications and radar emissions and performed direction finding on these signals in

SECRET

SECRET

order to strike at Israeli emitters. The accuracy demonstrated by the Soviet-supplied direction-finding equipment was greater than previously estimated. Also, the Egyptians used landlines extensively to make interceptions by the Israelis impossible. Even in forward areas and upon crossing the Canal, it was reported that the Egyptians used landlines.

(S) During the early stages of the war, when the Egyptians were on the offensive, they exploited Israeli errors in communications, security, and signal operating instructions. Throughout the war, the Egyptians jammed the air support nets that the Israelis used to call in close air support missions. Also, the tactical air and armored communications links were extensively jammed.

(S) Such massive use of communications jamming and interception by the Egyptians prompted the Israelis to minimize communications emissions and establish countermeasures. In the 1967 conflict, the Israelis dramatically exploited Egyptian communications. However, in the October 1973 War, the fact that the Israelis were initially on the defensive worked to their disadvantage. Nevertheless, the Israelis jammed Arab communications and exploited intercepted signals whenever possible.

(S) The general indication from the October 1973 War is that the U.S. should expect to encounter enemy forces with an understanding of the utility of communications jamming and interception in future conflicts. This should lead to a better U.S. awareness of the need for communications security and emission control.

C. GROUND-BASED AIR DEFENSE

(U) Several types of ground-based air defense weapons were employed for the first time in the October 1973 War. These modern weapons and large quantities of older weapons had important effects on the application of air power by both sides.

1. Inventories^{4 8}

a. Israeli Weapons

(S) The Israelis had 12 SAM batteries, roughly equivalent to 24 firing units. These were HAWK batteries with a total of 72 launchers. They had no REDEYES (similar to the Soviet SA-7), but they had about 800 20 mm and 40 mm AAA weapons. HAWK and the 40 mm AAA were controlled from the IAF headquarters or from the three territorial force headquarters. Each division had a battalion of 20 mm guns assigned to protect key targets within the division area.

b. Arab Weapons

(S) At the beginning of the war, the Egyptians had 150 SAM firing units with 840 launchers. Ten of these firing units were the modern SA-6 units with 40 launchers; the remainder were SA-2 and SA-3 units. The Egyptians also had 366 launchers for the

48. (U) Inventory, usage, and resupply information for air defense weapons is included in Tables 7 and 9 (pp. 42 and 44).

SECRET

TOP SECRET

shoulder-fired SA-7 missiles and about 1,500 AAA weapons. The Air Defense Command, a separate branch of the Egyptian Armed Forces, was responsible for national air defense operations. Apart from the Command were ground air defense assets organic to the field armies and to the divisions.

(S) The Syrians had 37 SAM firing units with 150 launchers. Fifteen were SA-6 units with 60 launchers; the remainder were SA-2s and SA-3s. They had 120 SA-7 launchers and about 700 AAA weapons. The National Air Defense forces are a part of the Syrian Air Force rather than being a separate command. However, as with the Egyptians, the Syrian ground defense assets organic to Army units were separate from the National Air Defense.

2. Israeli Ground-Based Air Defense

(U) The U.S. HAWK is capable of intercepting aircraft at altitudes from about 100 feet up to 45,000 feet (13.7 km). Its maximum range is about 35 km. The guidance system is of the semiactive homing type. Each battery has two radars capable of acquiring and tracking targets. Each of these radars directs a CW illuminator at a target, and the missile homes on the illuminator signals reflected from the target. Thus, a battery can engage two targets simultaneously.⁴⁹

(U) The HAWKs that the Israelis had were the wheeled version of "basic" HAWK.⁵⁰ The six launcher vehicles, two radar trailers, two illuminator trailers, and a command vehicle are interconnected with cables. These cables are a particularly vulnerable part of the system.

(S) Although the Israeli air defense doctrine of centralized control normally assigned targeting priority to the fighter-interceptors, the HAWK missile proved very effective: In only 32 recorded engagements during 6-29 October, HAWK scored 22 confirmed kills for 63 missiles fired.⁵¹ In 15 of these engagements there were no aircraft kills, though 20 missiles were fired. These misses were attributed to various causes such as hang-fire, system malfunction, and battery-under-attack. Three of the misses were caused by enemy aircraft maneuvers, suggesting that HAWK can be detected and outmaneuvered. Apparently resupplying missiles to the 12 HAWK sites was not a problem, since only 63 of the prewar inventory of 400 missiles were fired.⁵²

(S) The Israeli AAA weapons were not modern. Nevertheless, they are credited with destroying 57 fixed-wing and 21 rotary-wing aircraft. Forty-two Arab aircraft were shot down using the 20 mm AAA weapons that were deployed with the divisions;⁵³ these

49. (U) A HAWK battery can be divided into two separate firing units. Since the two radars are not the same—one being particularly good for targets at medium altitudes and the other for targets at very low altitudes—the two firing units would have complementary capabilities.

50. (U) There is also a tracked version of basic HAWK, and an "improved" HAWK that has wheeled vehicles. Even the tracked version has the radars and illuminators on wheeled trailers.

51. (U) Leavitt Report: *U.S. Military Operational Survey Team After Action Report in a Visit to the Israel Defense Forces, Israel*, Joint Chiefs of Staff, JCS 2369/50-1, 17 December 1973, TOP SECRET NOFORN.

52. (S) Three HAWK batteries (18 launchers) and 100 HAWK missiles were supplied to Israel during the war.

53. (U) Leavitt Report, op. cit.

TOP SECRET

TOP SECRET

consisted of two guns and a crude anti-aircraft sight mounted on a half-track vehicle. In addition, about 9 Arab air-to-surface missiles out of 26 launched were shot down by Israeli AAA or other ground fire.

3. Arab Ground-Based Air Defense

(S) Prior to the October 1973 War, the SA-2 had been used extensively, both in the 1967 Six-Day War and in the Southeast Asia conflict. The SA-3 and SA-6 had not previously been used. Like the longer range, high-altitude SA-2, the low- to medium-altitude SA-3 uses radio command guidance. Both the SA-2 and SA-3 were defeated or degraded by Israeli ECM equipment (mostly supplied by the U.S.) and by aircraft maneuvers.

(S) The SA-6 can intercept targets over about the same range of altitudes as can HAWK (100-45,000 feet), but its maximum range—18 km—is only half that of HAWK. The SA-6 uses the same type of guidance as HAWK. Unlike HAWK, however, it is highly mobile: all five vehicles in the SA-6 system (four launcher vehicles and one radar vehicle) are tracked. Emplacement time is shortened and vulnerability is lessened by using RF data links (rather than cables, as with HAWK) between the launchers and the radar. The effectiveness of the SA-6 is further enhanced by a TV tracker that can direct its CW illuminator. This capability would be particularly valuable when ECM or chaff were used against the target tracking radar. The SA-6 firing unit has only one illuminator and can engage only one aircraft at a time.

(S) The Israelis had no equipment to detect the SA-6 CW signal, and detection of the radar was not reliable because there were too many other signals. Visual detection of the missile was also a problem because of its small exhaust signature. The Israelis report that the missile can be outmaneuvered when detected.

(TS) The Israelis report that Arab SAMs destroyed about 40 Israeli aircraft. No distribution by SAM type is available. They also estimate that 2,000 to 3,000 SAMs were fired by the Arabs. If these values are correct, there were 50 to 75 SAMs fired per aircraft lost—roughly comparable to the SA-2 record in Southeast Asia. It is possible, of course, that the relatively small number of SA-6s fired did much better than this.

(S) The Soviet SA-7 is a man-portable IR homing missile system similar to the U.S. REDEYE.⁵⁴ This weapon was credited with 3 to 6 A-4E/Hs killed and 27 A-4E/Hs damaged; an estimated 5,000 SA-7s were fired. Thus, the probability of kill given a hit of an A-4E/H by the SA-7 appears to be only about 10 or 20 percent.⁵⁵ No A-4Ns were reported hit by SA-7s, but one F-4 was damaged. Previous tests have shown that the SA-7 is susceptible to IR decoy flares. About 5,000 of these flares were shipped to Israel at the end

54. (U) Israel did not have REDEYE during the war.

55. (S) Earlier speculation (WSFG Report 225: *Preliminary Assessment of the Effectiveness of Weapon Systems Used by Opposing Forces in the October 1973 Middle East War*, February 1974, TOP SECRET NOFORN/U.S. EYES ONLY) that the A-4E/Hs were vulnerable because of their slow speed may not be correct. The Israelis had installed more powerful engines in some of their A-4Hs, making them about as fast as the A-4Ns. The good survivability of the A-4N may have been due to its fire control system (allowing increased standoff distances) and to aircraft maneuvers.

TOP SECRET

TOP SECRET

of the war, but none were used. Contrary to earlier reports, the Israelis have no firm evidence that the Arabs had BRDM armored-vehicle-mounted SA-7s during the war.⁵⁶

(S) The Arabs had a wide variety of Soviet AAA weapons. Most of these weapons were old designs, some with simple optical-mechanical sights and some with radar and optically controlled fire directors. The modern ZSU-23-4 AAA weapon probably comprised on the order of 10 percent of the Arabs' 2,200 or 2,400 AAA weapons. Like one version of the U.S. VULCAN, the ZSU-23-4 vehicle is tracked. But unlike the VULCAN, the ZSU-23-4 has a radar for target acquisition and tracking; a gyro-stabilized fire control system, giving it a capability to fire on the move; four 23 mm guns, giving it an engagement range of 2.5 km for targets at altitudes up to 1.5 km (5,000 feet); and a land navigation system.

(TS) The Israelis report that Arab guns shot down about 30 Israeli aircraft. The number shot down by any one type is not known.

4. Mobility as a Factor in Air Defense

(S) Because of the failure of the Arabs to sustain heavy strike sorties or to mount an effective ground attack deep into Israeli territory, the mobility of the Israeli ground-based air defense systems was not severely tested. The HAWK sites were dug in, revetted, and camouflaged—an indication that there was no intention to move them. As a consequence, mobility for the HAWK batteries was kept to a minimum. One HAWK unit moved because of pressure applied by the Egyptian 3rd Army but returned to its original site in 2 to 3 days.

(S) The SA-6 and ZSU-23-4, the two primary threats to the IAF, are very mobile. The SA-6 system can be emplaced and operational in 20 minutes or less; by comparison, the emplacement time for HAWK is about 30 minutes. The march order time for the SA-6 is 5 to 7 minutes; as much as 45 minutes is needed for HAWK to displace. Thus, the SA-6 is potentially more difficult to find than HAWK. The ZSU-23-4 has a stabilized fire control and gun system, giving it a capability to fire on the move. The U.S. VULCAN has a less precise fire control system and is not stabilized.

(S) The SA-6 and the ZSU-23-4 can keep pace with their armored forces, making air attacks on these forces costly. While their mobility was not fully exploited on either front during the war, it has serious implications for a European conflict.

5. Command and Control and Identification of Friend or Foe

a. Israeli C&C and IFF

(S) The Israeli ground-based air defenses had difficulty distinguishing between friendly and enemy aircraft. The Israelis placed special emphasis on training their gunners to identify as many as 30 different types of aircraft. Each soldier in air defense units studied aircraft recognition for 15 to 40 hours.

56. (S) Speculation on the presence of this system was prompted by pilot reports concerning the firing of the missiles in salvos.

TOP SECRET

TOP SECRET

(S) Israeli aircraft were equipped with IFF (Identification of Friend or Foe) transponders, and GCI (Ground Control Intercept) and HAWK sites had IFF interrogators. However, HAWK batteries were assigned targets from IAF command and control channels and were generally operating in a "weapon-tight" condition when friendly aircraft were in the area. If communications were lost between the firing unit and the IAF Area Command Post, an automatic cease-fire would prevail and be maintained until communications were reestablished. There was one known engagement of friendly aircraft; the HAWK battery subsequently received the destruct command from the Area Command Post, and the missile was destroyed.

(S) The Israeli AAA guns were in a modified "weapon-free" status and were able to fire on any hostile target as determined by the firing section commanders and platoon leader. There were reported cases of firing against friendly aircraft, but none was shot down.

b. Arab C&C and IFF

(S) Command and control of Egyptian ground-based air defense systems near the Suez Canal was decentralized. SA-2 and SA-3 units operated under the control of the Air Defense Command. SA-6 units and some of the ZSU-23-4 guns were assigned to the Egyptian army. Infantry units equipped with SA-7s did not coordinate their activities with the air operation. This lack of centralized command and control over the air defense weapons may have been responsible for the loss of several Egyptian aircraft believed to have been shot down by Egyptian ground-based weapons.⁵⁷ This problem was particularly acute when their aircraft were returning from attacking Israeli targets.

(S) The Syrians apparently had air defense control centers at the division level but not in the maneuver brigades. The Syrians fired SAMs at Israeli aircraft even when their own aircraft were present in the area. This suggests either that they had IFF problems or their tactical doctrine required the air defense units to engage enemy aircraft in the presence of friendly aircraft. Command and control of the Syrian air defense was further complicated by the presence of the Jordanian ground forces. Although Syrian air defense units were provided to the Jordanians, apparently no communications link to the Syrian air defense was established; consequently, the Jordanian unit was said to have shot down an Iraqi aircraft.⁵⁸

(U) The use of IFF equipment by the Arabs is uncertain. However, it is known that the Soviets had such equipment for GCI and SAM sites.

57. (U) WSEG Report 237, op. cit., Volume IV, "Air Operations."

58. (U) USMOST Report: *After Action Report on a Visit to Jordanian Armed Forces (JAF), Amman, Jordan*, Joint Chiefs of Staff, J-3, JCS 2461/018-01, 22 May 1974, SECRET NOFORN.

TOP SECRET

SECRET**6. Passive Measures To Counter Air Threat****a. Israeli Measures**

(S) The Israelis used dummy HAWK sites with no RF emitters; only one such installation was attacked.⁵⁹ To enhance survivability, the real HAWK batteries were dug in, revetted, and camouflaged. (The Israelis believed that the Arabs knew the precise location of the HAWK sites. As a result, revetment was deemed more important than camouflage.) Five HAWK sites were attacked when the war broke out, causing the damage or destruction of one range-only radar and one high-power illuminator. All installations were back in operation in 4 to 5 hours.

b. Arab Measures

(S) Both dummy and alternate SAM sites were used extensively by the Egyptians—one or two in the vicinity of each occupied site. It was the policy of air defense units to move their SAM batteries to alternate sites often in order to confuse and complicate the Israeli targeting problem. It is estimated that within a 55-nmi stretch along the Suez Canal and extending to the west about 40 nmi, there were 90 confirmed SAM sites, of which roughly one-third would be occupied at any given time.

7. Air Defense Suppression⁶⁰**a. Israeli Suppression**

(S) The Israelis employed U.S. jamming equipment effectively against SA-2 and SA-3 systems. During the last 3 or 4 days of the war, the U.S.-supplied ALQ-119-7 gave the Israelis their first active capability against the ZSU-23-4 GUN DISH radar. However, the ALQ-119-7 was not employed against the SA-6. Countermeasures to the SA-6, based on experience gained during the war and subsequent testing of captured equipment, are being developed.

(S) The U.S. SHRIKE antiradiation missile (AGM-45) also covers the frequency spectrum of the SA-2 and SA-3, but not of the SA-6 illuminating radar or the ZSU-23-4 GUN DISH. The Israelis had a prewar inventory of 145 SHRIKES and received 150 more during the war. Some 197 SHRIKES, or about two-thirds of the total inventory, were launched, resulting in 10 to 14 hits. While the probability of hit appears low, the missile was effective in suppressing the air defenses during an attack by forcing the enemy to turn off his radars.⁶¹

(S) The Israelis also used chaff to decoy the SA-6 missile, but there is no evidence that this approach was successful. Chaff was found to be effective against the ZSU-23-4

59. (U) WSEG Report 237, op. cit., Volume IV, "Air Operations."

60. (U) A more extensive discussion of electronic warfare is presented in Chapter III, Section J.

61. (U) This is in accordance with U.S. experience in Southeast Asia.

SECRET

SECRET

GUN DISH by forcing the gun into an optical tracking mode, thereby reducing its daytime effectiveness and defeating it at night.

b. Arab Suppression

(S) The Arabs did not use any special equipment to suppress Israeli HAWK sites. (Damage to HAWK sites resulted from conventional bombs.) However, some 26 Soviet-supplied KELT air-to-ground missiles—a subsonic, long-range guided weapon with an anti-radiation capability—were launched from TU-16 missile-carriers, with 2 successful hits against the TPS-43 early warning (EW) radars. After the first successful attack, the Israelis adopted the tactic of shutting down all GCI/EW radars when a TU-16 and/or KELT was detected. The Israelis reported that at least eight potential launches were aborted and three misses were recorded because of radar shutdowns. Nine of these subsonic missiles were reported to have been destroyed by AAA weapons and other ground fire, and at least one was destroyed by MIRAGE fighter aircraft.

SECRET

SECRET**Chapter III****THE AIR WAR**

(U) This chapter presents inventory data both for aircraft and airborne ordnance. It also examines various tactical aspects of the air war, including close air support (CAS); employment of air power against armor, against aircraft on the ground, and against other aircraft in air-to-air combat; use of electro-optical (EO) guided weapons; aircrew training; aerial reconnaissance/surveillance; and electronic warfare.

(U) Quantitative comparisons of competing weapon systems were not always possible due to the lack of data and complete descriptive material. Replies have not been received from the Israeli Air Force (IAF) in response to questionnaires that were constructed to obtain data that would adequately describe the air-to-air and air-to-ground operations. Without these, or equivalent sources of data, many questions of interest and concern cannot be answered satisfactorily.

A. INVENTORIES OF ISRAELI AND ARAB COMBAT AIRCRAFT

(U) This section identifies the aircraft resources that were available to each side during the war and shows the extent to which they were used in terms of sortie activity and aircraft losses.

1. Inventories

(S) Inventories of aircraft assigned to operational units for both sides at the beginning of the war are presented in Table 16. Israel had a total of 718 manned aircraft and 10 reconnaissance drones assigned to operational units in country, as compared to a total of 1,214 aircraft for Egypt and Syria combined. An additional 558 aircraft—62 Israeli, 361 Egyptian, and 135 Syrian—were either in storage or not assigned (these are not shown in Table 16).

(S) In the critical fighter/bomber category, the Israeli combat force was outnumbered two to one by the combined Arab forces (~730:350). However, the payload capability of each Israeli aircraft was considerably greater than that of the corresponding Arab aircraft. The bulk of the Israeli fighter/bomber force consisted of U.S. A-4 SKYHAWKS and F-4E PHANTOMS (49 and 28 percent, respectively), whereas the Arab force was dominated by the Soviet MIG-21 FISHBEDs and MIG-17 FRESCO (53 and 26 percent, respectively).

SECRET

SECRET

Table 16 (S). Israeli/Arab Aircraft Inventories at Start of 1973 War*

Israeli Aircraft		Arab Aircraft			
Type	No.	Type	Number		Total Arab
			Egypt	Syria	
Fighter/Bomber					
SKYHAWK A-4E	61	MIG-15 FAGOT	16	0	16
A-4H	80	MIG-17 FRESCO	96	84	180
A-4N	31	MIG-21 FISHBED	263	106	369
PHANTOM II F-4E	99	SU-7 FITTER A	50	39	89
MIRAGE III-C	34	SU-17/20 FITTER B	15	0	15
MIRAGE 5(M-5)	27	HUNTER (Iraq)	16†	0	16†
SUPER MYSTERE B-2	22	MIRAGE 5(M-5) (Libya)	16†	0	16†
	<u>354</u>		<u>472†</u>	<u>229</u>	<u>701†</u>
Bomber					
None	0	BADGER A/G	26	0	26
Trainer					
MAGISTER (M-170)	89	L-29 DELPHIN	8	55	63
MIRAGE III-B	2	MIDGET	29	7	36
SKYHAWK TA-4F	4	MIG-21 MONGOL	40	10	50
TA-4H	10	SU-7 MOUJIK	20	4	24
TA-4J	6	DHC-1 CHIPMUNK	0	12	12
		MAX	0	6	6
	<u>111</u>		<u>97</u>	<u>94</u>	<u>191</u>
Reconnaissance					
EC-97G	1	MIRAGE III-R (Libya)	2‡	0	2‡
MIRAGE III-C	2	MIG-21 FISHBED H	6	4	10
PHANTOM II RF-4E	6	MIG-25 FOXBAT (USSR)	4§	0	4§
FIREBEE DRONE	10‡	SU-7 FITTER (Recon)	6	0	6
	<u>19‡</u>		<u>18†§</u>	<u>4</u>	<u>22†§</u>
Helicopter					
ALOUETTE II	6	MI-2 HOPLITE	0	8	8
AUGUSTA/BELL UH-1	47	MI-4 HOUND	29	7	36
JET RANGER 206A	12	MI-6 HOOK	11	0	11
SEA STALLION CH-53A	16	MI-8 HIP	105	35	140
SUPER FRELON	11				
	<u>92</u>		<u>145</u>	<u>50</u>	<u>195</u>
Transport					
HERCULES C-130H	2	AN-2 COLT	2	0	2
NORATLAS NORD 2501	22	AN-12 CUB	21	3	24
SKYTRAIN C-47	13	AN-24 COKE	0	2	2
STRATO FREIGHTER	10	IL-14 CRATE	43	6	49
	<u>47</u>		<u>66</u>	<u>11</u>	<u>77</u>
Utility					
CESSNA 180/206	21	AERO COMMANDER	2	0	2
DORNIER DO 27/28	27				
PIPER PA 18/22	56				
RALLYE MS	1				
	<u>105</u>		<u>2</u>	<u>0</u>	<u>2</u>
Total Aircraft	728‡	Total Aircraft	826†§	388	1,214†§

†Includes forces from other countries located in country.

‡Includes 10 reconnaissance drones.

§FOXBAT aircraft were manned by Soviet crews.

SECRET

25X1

SECRET**2. Sortie Activity**

(S) The daily sortie activity associated with the combat aircraft forces of each side is illustrated in Figure 1. The most striking observation is the large difference in total sortie activity performed by each side for the size of the combat force available. In spite of the Arabs' numerical superiority in combat aircraft (which, with the aid of the Soviet resupply effort, they were able to maintain throughout the war), Israel was able to mount a sortie effort on the order of four or five times that of the Arabs.¹

(S) Although there are insufficient data to permit an effectiveness comparison between an Israeli and Arab sortie, some inferences can be drawn from known aircraft characteristics and Israeli ordnance loading practices. Maximum payload capabilities of the A-4 and F-4 are 8,000 and 16,000 pounds, respectively; the MIG-21 and MIG-17 are each capable of carrying only 2,200 pounds. Therefore, a single Israeli A-4 or F-4 sortie could have delivered four or seven times as much ordnance as a comparable Arab sortie. In actual practice, however, the Israelis apparently allocated somewhat less than one-half of their aircraft payload capacity to ordnance due to fuel and possibly ECM pod requirements. Nonetheless, an Israeli sortie generally carried two to three times as much ordnance as a comparable Arab sortie.

3. Attrition

(S) The Arabs are reported (mainly from Israeli sources) to have lost approximately 500 combat aircraft during the war, while the Israelis lost only 102.² While this exchange ratio is significant, it becomes even more so when the associated air activity is considered. With a five-to-one ratio of total Arab to Israeli aircraft losses and an estimated sortie activity differential of one to four or five, the comparative aircraft attrition rate is on the order of 20 to 25 times higher for an Arab sortie than for an Israeli one. Although actual Arab losses may be lower than estimated by the Israelis and the ratio of sorties flown is not firmly known, the overwhelming nature of the comparative results is believed to be valid.

(U) The distribution of losses by cause is shown for both the Israelis and the Arabs in Table 17. The most striking feature of this table is that most of the Arab losses were caused by air-to-air combat, whereas the Israeli losses were caused primarily by ground-based air defenses.

4. Effect of Aircraft Resupply Efforts

(S) To compensate in part for the large losses incurred during the war, the United States supplied Israel with an additional 36 A-4s and 40 F-4Es; the Soviet Union also supplied the Arabs with substantial numbers of additional combat aircraft.³ However, it

1. (S) The number of Arab sorties is based on Israeli estimates, with an allowance for additional air defense sorties by the Arabs.

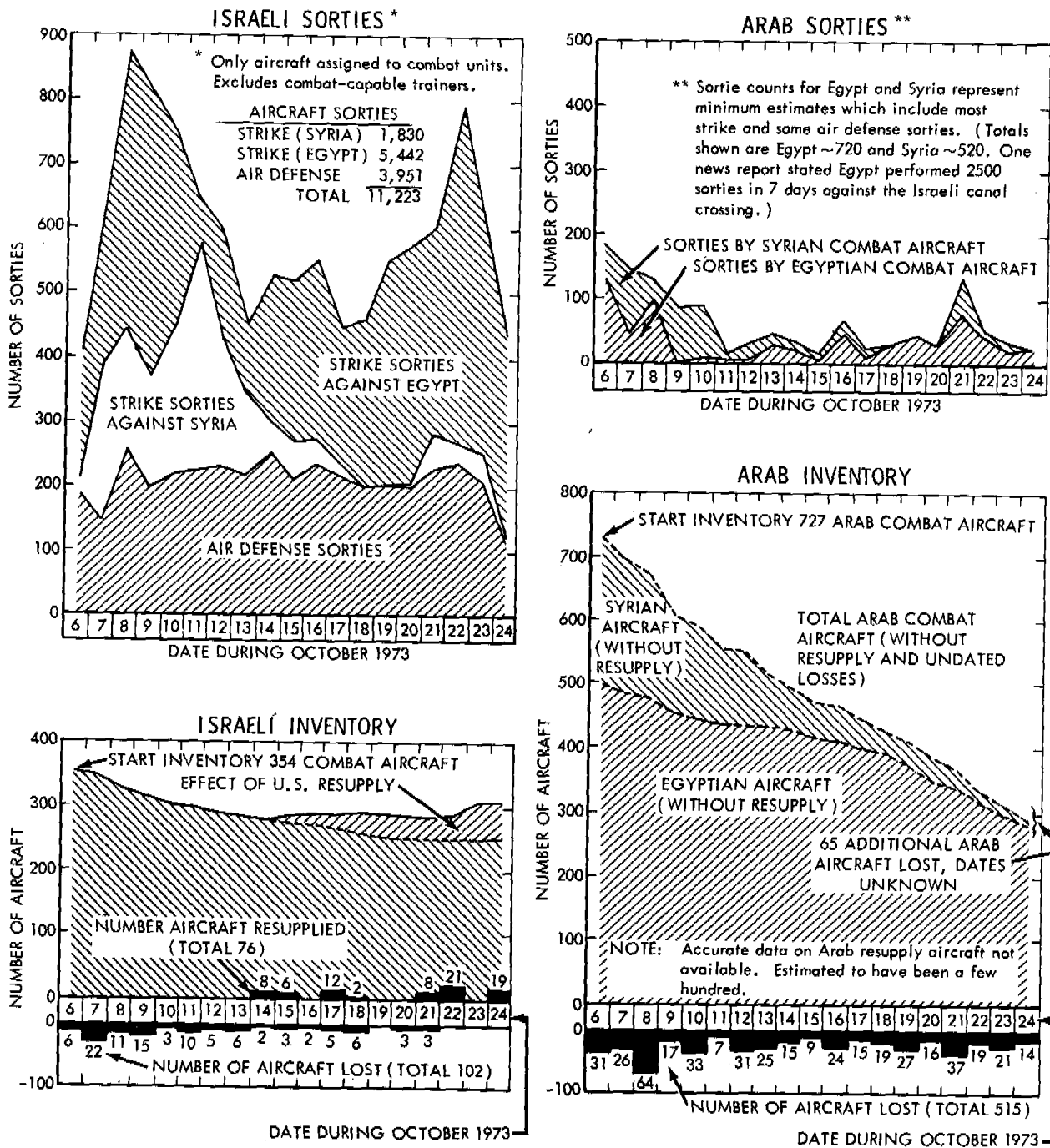
2. (U) Domsday Report, *Air Force Operations in Domsday War, 6-24 October 1973*, Primary Report, Hq Israeli Air Force, November 1973, SECRET; and WSEG Report 237, op. cit., Volume IV, "Air Operations."

3. (S) Data on exact quantities and types are not available. states that a few hundred were probably supplied.

25X1

SECRET

SECRET



DATA SOURCES: (1) *Free World Air Order of Battle*, Vol. II: Middle East and Africa, DIA, 1 October 1973, SECRET NOFORN.
 (2) WSEG 237, *Air War Chronology*, to be published, SECRET.
 (3) The Domsday Report, *Air Force Operation in Domsday War*, 6-24 October 1973, IAF, undated, SECRET.

9-27-74-2

Figure 1 (S). Daily Inventory and Sortie Activity of Israeli and Arab Combat Aircraft

SECRET

TOP SECRET*Table 17 (TS). Aircraft Losses by Cause*

<i>Losses Attributed to</i>	<i>Israeli Losses*</i>	<i>Arab Losses†</i>
Air Combat		
Air-to-Air Weapons	3	261
Other‡	0	73*
	<u>3</u>	<u>334</u>
Ground-Based System		
SAM, Crew-Served	39§	22□
SAM, Man-Portable	3△	—
AAA	27	78
SAM/AAA	6	—
	<u>75</u>	<u>100</u>
Miscellaneous Causes		
Technical Failure	8	
Other	6	22◇
Unknown	10	59
	<u>24</u>	<u>81</u>
Total	<u>102</u>	<u>515</u>

*Preliminary Assessment of the Effectiveness of Weapon Systems Used by Opposing Forces in the October 1973 Middle East War, WSEG Report 225, February 1974, TOP SECRET NOFORN/U.S. EYES ONLY.

†U.S. Military Operational Survey Team After Action Report in a Visit to the Israel Defense Forces, Israel, JCS 2369/50-1, 17 December 1973, TOP SECRET NOFORN. Also referred to as the Leavitt Report.

‡Such as flying into the ground, premature ejection, etc.

§Losses to SA-2/3/6.

□Losses to HAWK.

△Losses to SA-7.

◇Destroyed on the ground.

does not appear that either the high losses or the resupply efforts were a governing factor in limiting the daily sortie-rate performance of the Israeli and Arab combat aircraft forces. (One possible exception may have occurred on 22 October, when the Israelis achieved a peak of almost 800 sorties.) For the Israelis, the actual need for sorties appears to have been the most limiting factor, since there were many days when the number of sorties performed was only about half of the surge capability demonstrated on 8 and 22 October (see Figure 1), with relatively little change in total aircraft inventory. In the case of the Arabs, the only plausible explanation for the relatively low amount of air activity performed by their always numerically superior air force is a lack of will or skill.

TOP SECRET

TOP SECRET**B. INVENTORIES OF ISRAELI AIRBORNE ORDNANCE⁴**

(S) Table 19 lists the amounts of Israeli airborne ordnance that were (1) on hand prior to the start of the October 1973 War, (2) resupplied during the war, (3) expended during the war, and (4) remaining in stock at the end of the war. In order to better understand the significance of the quantities shown in Table 19, the major categories of Israeli ordnance are summarized in Table 18 in terms of equivalent weight. Table 18 shows that the prewar stockage of Israeli ordnance consisted largely of general purpose (GP) bombs (83 percent by weight). This was followed by a significantly smaller proportion of cluster bombs (12 percent). The remaining ordnance consisted of rockets (4 percent) and guided bombs, gun ammunition, air-to-air missiles, and air-to-ground missiles (1 percent).

Table 18 (TS). Total Weight of Israeli Air Ordnance (short tons)

<i>Type of Ordnance</i>	<i>Stock on 6 October</i>	<i>Resupply 15-24 October</i>	<i>Total War Expenditures</i>	<i>Stock on 25 October</i>
GP Bombs	20,400	250	8,710	11,940
Cluster Bombs	2,900	3,260	4,160	2,000
Rockets	1,100	67	87	1,080
Guided Bombs	150	90	85	155
Air-to-Ground Missiles	28	99	50	77
Air-to-Air Missiles	50	37	28	59
Gun Ammunition	90	50	5	135
Total Tonnage	24,718	3,853	13,125	15,446

Source: See Table 19, of which this table is a summary.

(S) Israeli wartime expenditures also reflected heavy emphasis on GP bombs. However, the proportions of GP and cluster bombs actually used were considerably different than planned: Actual expenditures by weight were 66 percent and 32 percent, respectively, which reflects a change from a planned seven-to-one ratio to an actual two-to-one ratio. The unforeseen emphasis on cluster bombs is also reflected in the urgent U.S. resupply effort of air ordnance, which consisted of 85 percent cluster bombs. With the resupply effort, Israel's usage exceeded its initial inventory by 36 percent in quantity or 43 percent in weight.

4. (U) Similar data on Arab airborne ordnance are not available.

TOP SECRET

TOP SECRET*Table 19 (TS). Estimated Israeli Air Ordnance Inventory and Expenditures*

Type of Ordnance	Stock on 6 October	Resupply 15-24 October	Total War Expenditures	Stock on 25 October
General Purpose Bombs				
MK 82 500-lb GP	66,275	0	29,741	36,534
MK 83 1,000-lb GP	1,923	500	1,342	1,081
MK 84 2,000-lb GP	1,180	0	156	1,024
M-118, 3,000-lb GP	441	0	0	441
	<u>69,819</u>	<u>500</u>	<u>31,239*</u>	<u>39,080</u>
	0	250	15	235
	1,460	0	1,460	0
	0	12	12	0
	0	1,926	990	936
	4,670	1,794	6,236	228
	668	2,754	1,518	1,904
	714†	2,338	?	3,052-?
	<u>7,512</u>	<u>9,074</u>	<u>10,231+?</u>	<u>6,355-?</u>
Rockets				
2.75" FFAR 18-lb HE/AP/AT	46,082	3,828	8,635	41,275
5" ZUNI 100-lb HE/AP/AT	<u>12,284</u>	<u>600</u>	<u>177</u>	<u>12,707</u>
	58,366	4,428	8,812	53,982
Guided Bombs				
MK 84 HOBO 2,200-lb GP	94	33‡	30	97
WALLEYE I 1,100-lb AM	<u>95</u>	<u>100</u>	<u>97</u>	<u>98</u>
	189	133	127	195
Air-to-Ground Missiles				
MAVERICK 500-lb AT	0	300	50	250
SHRIKE 400-lb FRAG	<u>145</u>	<u>150</u>	<u>197</u>	<u>98</u>
	145	450	247	348
Air-to-Air Missiles				
AIM-7 SPARROW	106	78	49	135
AIM-9 SIDEWINDER	276	209	182	303
SHAFRIR (DRAGONFLY)	?	?	210	?-210
	382+?	287+?	441	228+?
Gun Ammunition				
20 mm MK 12 (A-4)	120,000	0	1,020	118,980
20 mm M-61 (F-4)	250,000	200,000	20,300	429,700
30 mm (A-4, MIRAGE, SMB2)	?	?	?	?
	<u>370,000+?</u>	<u>200,000+?</u>	<u>21,320+?</u>	<u>548,680+?</u>

*Value based on Israeli estimates presented in *Air Force Operations in Doomsday War, 6-24 October 1973*, Primary Report, Hq IAF, November 1973, SECRET (also referred to as the Doomsday Report). This estimate is approximately twice that given in the Casey Report. Breakdown of individual types of GP bombs assumes same percentages as in the Casey Report. Remaining stock on 25 October adjusted accordingly.

†Quantity known to have been delivered prior to start of war.

‡From contractor shipping records.

GP—General-Purpose; AP—Anti-Personnel; AM—Anti-Material; AVM—Anti-Vehicular Mine; AT—Anti-Tank; HE—High-Explosive; FRAG—Fragmentation.

Source: Based mainly on *Final Trip Report, U.S. Military Equipment Validation Team (USMEVTI) JCS 2369/49-2*, 20 November 1973, TOP SECRET/SENSITIVE (also referred to as the Casey Report); and on JCS logistic records.

25X1

TOP SECRET

TOP SECRET

(S) This sizable change between planned and actual expenditures is believed to be due largely to the Arabs' ground-based air defenses, which were much more intense than those that the Israelis encountered in the 1967 war. To minimize exposure to defenses, Israeli aircrews were forced to switch from the close-in, pinpoint dive bombing techniques used in the 1967 war to loft and pop-up bombing methods. They apparently believed that cluster bombs would at least partially compensate for reduced delivery accuracies. This intense air defense environment is also believed to have limited the use of rockets and guns against ground targets to levels much lower than those provided for by the prewar inventories.

(S) While no data are available regarding Arab ordnance inventories, it is known that they used 500- and 1,100-pound bombs of GP, cluster, and fragmentation varieties. Extensive use was also apparently made of unguided air-to-ground rockets somewhat similar to the U.S. 2.75- and 5-inch rockets. In addition, at least 26 air-to-ground KELT antiradiation cruise missiles were used, as were unknown amounts of ATOLL air-to-air missiles and gun ammunition. There is no evidence that the Arabs used or had access to guided weapons comparable to the U.S. HOBO, MAVERICK, or WALLEYE, which were supplied to Israel toward the end of the war.

C. CLOSE AIR SUPPORT

1. Israeli CAS

a. Concept of Operation

(U) The concept of operation developed by the Israel Defense Forces (IDF) for close air support (CAS) is similar to that used by U.S. forces.⁵ Control of air forces is centralized, with requests for air support from troops in combat processed through the appropriate command echelon. Detailed targeting information and control of strike aircraft in the vicinity of friendly forces is provided by verbal radio contact with forward air controllers (FACs). In U.S. forces, forward air control is a specialized function performed by Air Force pilots who are preferably airborne but who may operate on the ground attached to a ground force maneuver unit. In the IDF, this function is performed as an additional duty by nonpilot artillery liaison officers (ALOs) assigned at battalion and company levels, and assisted by forward artillery observers (FOs). In both forces, the distinction between CAS and interdiction lies primarily in whether the FAC function is required by the proximity of friendly forces. A "bomblines" is generally established some distance (25 to 30 km in the IDF) in front of the FEBA beyond which no coordination with ground forces is required for air strikes.

5. (U) *Close air support* is used here as defined by the U.S. Department of Defense (see footnote 18, p. 17). The Israelis use the same term for a somewhat broader scope of air strikes.

TOP SECRET

SECRET**b. Effort Devoted to CAS**

(S) The IAF flew 7,272 strike sorties (65 percent), with the remainder of the effort devoted to air defense. The portion of these sorties devoted to CAS and to interdiction is not known. However, it is estimated that 90 percent or more were preplanned strikes at 5 km or more beyond the FEBA.⁶ In the early stages of the war, the IAF was heavily engaged against attacking ground forces, but there was a shortage of ALOs and FOs due to the confusion of emergency mobilization (and air forces were used much as nonadjusted artillery). Most of this action would not be considered CAS, according to the U.S. definition. The level of CAS was increased during the last few days of the war in areas where enemy anti-aircraft defenses had been suppressed.

c. Problems and Results

(S) The concept of operation developed by the IDF for providing CAS failed during the October 1973 War.⁷ The principal reason for this failure was the intense Arab SAM/AAA defense environment, which made unacceptable the delays in the target area attendant to forward area control from the ground. Enemy defenses forced a change of tactics. One tactic adopted employed low-level (50 feet or less) ingress to preplanned initial reference points with pop-up to altitude (7,000 to 12,000 feet) for target acquisition and weapon delivery. Weapons were delivered in a single pass, followed by immediate, low-altitude egress. Another tactic, used on the Syrian front, was loft bombing. Thus, the vital function for CAS of providing the strike pilot with information concerning the location of friendly forces and with detailed targeting information was difficult or impossible to perform. Adjustment of ordnance delivery from the first strike results was impossible.

(S) Technical difficulties were encountered by the Israelis in the following areas:

- (1) *Target identification and marking.* Artillery marking rounds were difficult to see from the air and difficult to differentiate from other explosions in the battle area. Intelligence was often obsolete and was poorly coordinated between ground and air forces.
- (2) *Identification and marking of friendly forces.* Colored smoke and panels used by ground forces were not easily seen from the air and were readily imitated by the Arabs. Reliance on aircraft recognition training of ground forces and distinctive aircraft markings proved inadequate and resulted in a number of instances of troops firing at friendly aircraft.
- (3) *Radio communications.* Confusion resulted from the use of many different identification signals by various elements in the command and control network. Arab electronic jamming interfered with both air-to-air and air-to-ground communications.

6. (U) WSEG Report 237, op. cit., Volume IV, "Air Operations."

7. (U) *Close Air Support to the Ground Forces*, Israeli Ministry of Defense, 28 July 1974, SECRET.

SECRET

SECRET

- (4) *Night attack.* The use of night vision equipment by Arab infantry and armor permitted them to keep pressure on IDF ground forces after dark. The use of flares by the IAF for night CAS proved less than desirable.

d. Implications for U.S. CAS

(S) During future conflicts in which intense antiaircraft defenses are encountered, the present U.S. concept of operation for CAS cannot be expected to produce much better results than were achieved by the IDF. The viability of an airborne FAC in such an environment performing the vital function of targeting and control of strike aircraft in proximity to friendly forces is certainly questionable. Even if the FAC can survive, there remains a basic problem in providing the strike pilot with the information needed to permit a timely flight directly to the target for an immediate, effective, first-pass strike. The same technical difficulties encountered by the IDF can be expected to plague American forces, perhaps intensified by adverse weather and the multinational nature of a conflict involving NATO.⁸

2. Arab CAS

(S) The concept of operation employed by the Arabs for CAS is not known. According to the Israelis, the Arabs flew 800 to 1,000 strike sorties during the war. There is no information concerning how many, if any, of these sorties were devoted to CAS. The Israelis have stated that Arab air attacks had little effect on IDF ground forces other than to cause some soldiers to fire indiscriminately at all aircraft including their own.⁹

D. EMPLOYMENT OF AIR AGAINST ARMOR

(S) No conclusive evidence has been found that the IAF was successful in killing a significant number of Arab tanks in the environment of intense air defense that accompanied the land battles of the October 1973 War. However, it is possible that air may have disrupted the logistic supply to tanks or their accompanying infantry. In areas away from this intense air defense, however, the IAF scored 103 hits on Arab tanks and other vehicles by guided weapons (WALLEYE, HOBBO, and MAVERICK).¹⁰ The IAF also made limited use of ROCKEYE antiarmor bombs against tanks, but apparently with limited effect.¹¹

8. (S) Several technological developments are underway that offer promise of relieving some of these technical difficulties. Most notable is the use of ground laser designators for target location and identification by strike aircraft equipped with laser spot seeker/tracker equipment. This permits the use of laser-guided ordnance for improved accuracy while permitting the strike aircraft to stand off from the enemy defenses. Night attack capability is greatly improved and, when combined with radar or LORAN beacons for offset bombing in the blind, a measure of adverse weather capability is introduced. Concepts of operations for these new systems have not yet been defined. Considerable joint Service development and training will be required before they are operational.

9. (U) *Minutes of Air/Ground Meeting-TSERFIN*, 23 April 1974, as reported by J. H. Hoblit, Lt. Col. USAF, WSEG Data Acquisition Team member, SECRET.

10. (U) WSEG Report 237, op. cit., Volume IV, "Air Operations."

11. (U) DIA Lessons Learned Report, op. cit.

SECRET

SECRET

(S) The Arab air-to-ground efforts posed no real threat and, except for harassment, did not influence the ground battle.¹²

1. Examination of Killed Tanks

(S) The Combat Vehicle Assessment Team (CVAT) examined and classified impacts on 435 Arab tanks and 119 Israeli tanks. These were tanks that had been killed or abandoned in Israeli-controlled territory; they did not include tanks from areas where the IAF had employed EO guided weapons (see Section E). Hence, the classification of hits by the CVAT was necessarily confined to tanks that could have been attacked from the air only by unguided weapons.

(S) The CVAT found that, of the 435 Arab tanks examined, only 3 showed evidence of impacts caused by air ordnance (2 of these 3 hits were made by ROCKEYE).¹³ There was no evidence of impacts caused by Arab air-delivered ordnance on any of the 119 IDF tanks examined. This evaluation was based on the nature of the damage sustained by the tanks and the direction of each impacting round relative to the tank.

2. Air Action Against Tanks on the Syrian Front

(S) There have been conflicting opinions concerning the importance of air strikes in stopping the Syrian armored forces that broke through the northern front during the early days of the war. Demolished tanks were reported to have been found in locations along the northern front where they could only have been attacked from the air.¹⁴ However, no confirming evidence of this report has been found. The CVAT examination of tanks taken from the Syrian front did not find significant indication of damage sustained from air attacks. The IAF does state that missions were flown on the Syrian front in support of the ground forces during the first days of the war.¹⁵ However, this information is not complete enough to permit any conclusions regarding the effectiveness of air strikes against armor on this front.

(C) No reliable reasons for the withdrawal of the Syrian armor have been discovered. The decision to withdraw may have resulted from overextended supply lines or for other tactical or logistic reasons. The presence of the IAF may have influenced this decision because of the perceived threat that air power could pose to exposed armor units or to their supply lines.

12. (U) Comfy Coat Report: *EW in the Middle East*, Air Force Special Communications Center, EB 8-74, June 1974, SECRET NOFORN.

13. (U) WSEG Report 237, op. cit., Volume VII, "Combat Vehicle Assessment Report."

14. (U) S. L. A. Marshall, Briefing to WSEG, 14 February 1974, Subject: Observations Based on Trip to Israel for AMSAA, SECRET.

15. (U) Domsday Report, op. cit.

SECRET

SECRET**3. Air Action Against Tanks on the Egyptian Front**

(S) It has been reported that the IAF stopped and largely destroyed a substantial number of tanks and support vehicles that were proceeding along the western edge of the Sinai peninsula in the vicinity of Ras Masala.¹⁶ The tanks were supposed to have started toward Sharm el Sheikh without supporting air defense. Although the occurrence of this incident has been generally confirmed by an IAF officer,¹⁷ no specific information is available. In fact, the date of this action is not available. The IAF has documented that air strikes were launched against armor on a daily basis at the Ras Masala area during 11-16 October (as well as strikes against other types of targets at other locations), but no further description of the targets or of the results achieved is given.¹⁸ Neither is there any indication of the type of ordnance used by the IAF during these strikes.

(S) It is possible that EO guided weapons—WALLEYE in particular—were used against the tanks near Ras Masala. WALLEYE was used against tanks as early as 12 October in the Ras Masala zone.¹⁹ HOBO was not used against tanks until 16 October—the last day that the IAF documents strikes against tanks at Ras Masala—and MAVERICK was not launched against tanks before 22 October. The IAF is credited with stopping this tank column on the basis that no other Israeli force could have reached that location.²⁰ The location of these tanks precluded the possibility of their examination by the CVAT.

(C) There has been speculation that the IAF may have prevented Egyptian armor from moving against the IDF on the west side of the Canal after the Israeli crossing on 15 October. Again, there is no evidence to support any such action.

E. USE OF ELECTRO-OPTICAL GUIDED WEAPONS

(U) Air-to-ground EO guided weapons were employed in the October 1973 War only by Israel. Laser guided weapons were requested from the United States by Israel but were not approved for delivery. This section summarizes the Israeli experience with U.S.-supplied EO weapons and identifies its significant aspects.

1. EO Guided Weapon Expenditures

(S) Three types of EO guided weapons were used: the 500-pound MAVERICK missile, the 1,100-pound WALLEYE I bomb, and the 2,200-pound MK 84 HOBO bomb. A total of 177 of these weapons were expended during the war (30 HOBOS, 50 MAVERICKS, and 97 WALLEYE Is), compared to about 40,000 bombs of all types expended by Israel. Reasons for the relatively low expenditure level probably include the low initial inventories

16. (U) Talbott Trip Report, op. cit., p. H-3.

17. (U) Letter from R. Melamed, Lt. Col. IAF, to B. F. Williams, Col. USA (WSEG), May 1974.

18. (U) Doomsday Report, op. cit.

19. (U) WSEG Report 237, op. cit., Volume IV, "Air Operations."

20. (U) Letter from R. Melamed, op. cit.

SECRET

SECRET

(94 HOBOS, 95 WALLEYES, and no MAVERICKS), relatively late resupply (33 HOBOS and 100 WALLEYES were delivered to Israel on 15 October, and 300 MAVERICKS arrived on 18 October), and possibly high unit weapon costs.

2. Employment of EO Guided Weapons

(S) Most of the EO guided weapons that were expended were used on the Egyptian front during the latter half of the war in a relatively low-intensity defensive environment. This environment permitted several dry runs to be made when required to achieve weapon lock-on, as well as the use of up to six firing passes (in the case of MAVERICK) during a single aircraft sortie.

(S) The standoff ranges at which the EO guided weapons were released—generally 2 to 3 nautical miles (nmi) from their targets, with one extreme of about 7 nmi—were considerably below their maximum capabilities.²¹ These short ranges of release were very similar to those achieved by the United States in Southeast Asia (average of 1.9 nmi for WALLEYE I and 3.0 nmi for HOBOS²²) and in the MAVERICK field testing (2.2 nmi²³).²⁴

(S) Approximately 50 percent (87 weapons) of the EO guided weapons expended were employed against tanks, 15 percent (26 weapons) against other vehicles such as APCs and trucks, and 35 percent (64 weapons) against bunkers, POL or water tanks, bridges, and other targets. Figure 2 illustrates the distribution of targets by type of weapon.

3. Effectiveness of EO Guided Weapons

(S) Based on the percentage of weapons that hit the target and were observed to detonate, the Israelis achieved the greatest success with WALLEYE (82 percent), followed by MAVERICK (64 percent) and HOBOS (42 percent). (A more detailed breakdown of the performance of the EO guided weapons is shown in Figure 2.) The performance obtained by the Israelis compares rather closely with U.S. experience in Southeast Asia, which yielded 72 percent success for WALLEYE and 45 percent for HOBOS.²⁵ This close comparison is particularly noteworthy when the differences between U.S. and Israeli employment of EO weapons are noted: Israel used 50 percent of its EO weapons against tanks, whereas the United States used almost 60 percent of its EO weapons against bridges

21. (S)

22. (U) WSEG Report 236, *Evaluation of Guided Bomb Systems Employed in Southeast Asia*, May 1974, SECRET.

23. (U) WSEG Report 185, *Operational Test and Evaluation of MAVERICK*, September 1972, CONFIDENTIAL.

24. (U) The standoff ranges of these weapons were probably determined by their ability to achieve reliable lock-on to the targets that were actually attacked. The EO sensors require that the target subtend a specified minimum angle, as seen by the sensor, as well as present a specified minimum contrast ratio with the background. Ability to make use of the larger standoff flight ranges that these weapons are capable of would require targets larger than vehicles.

25. (U) WSEG Report 236, *op. cit.*

SECRET

Page Denied

SECRET

and virtually none against tanks.²⁶ (The United States used many more laser guided weapons than EO type in Southeast Asia—a ratio of about 16 to 1. The most frequent targets for these were roads and vehicles other than tanks.²⁷)

(S) Although the Israelis did not conduct detailed damage assessment of the targets struck by their weapons, it is known that, given a direct hit, all three will severely damage or destroy the hard point targets for which they were designed. Therefore, the percentage of weapons that hit the selected targets and detonated is considered to be a reasonable measure of effectiveness.²⁸ Further, it is considered reasonable, in a target-rich environment, to base this percentage on the total number of weapons carried (including weapons that were returned to base). This measure then includes instances when it was found impossible to engage the target. It is believed that the Israelis flew sorties with these special weapons only when suitable targets were known to exist, although there may have been a few exceptions.

(S) While EO weapons were effective, the Israelis used them under relatively ideal conditions—daylight, good weather, low terrain clutter, and low defensive environment. Thus, caution should be exercised in extrapolating these results to other environments.

F. ATTACK OF AIRCRAFT ON THE GROUND

(S) The Arab air forces suffered a disastrous defeat in 1967, when 370 aircraft were destroyed on the ground in a preemptive strike by the IAF. That costly experience showed the Arabs that unprotected aircraft on the ground are highly vulnerable. Before the October 1973 War, enough aircraft shelters were built to protect all Syrian and Egyptian tactical aircraft, and the fields were defended by SAMs and AAA. As a result, the Israelis were able to destroy only 22 aircraft on the ground in 1973, according to their own claims. The level of effort devoted by the IAF to airfield attacks was approximately the same (500+ sorties) as in 1967, and the strike aircraft were more capable. Details of these attacks are not known.

(S) Five types of aircraft shelters were observed at the captured Egyptian airfield at Fayid on the west bank of the Canal. Four types were above-ground shelters (single and double, with openings on one or both ends), and one type was an underground shelter (single, with one end opening). About three-fourths of the aircraft shelters in Egypt were identical or very similar to those at Fayid.²⁹ It is not known whether or not they are of Soviet design.

26. (U) Ibid.

27. (U) Ibid.

28. (S) Some of the recorded misses struck very close to the target, and it is believed that the weapon was locked onto the edge of the shadow cast by the target on the ground. This is a result of the method of employment of the weapon, and such misses could be reduced by approaching the target from a different direction. It has also been reported that in some cases the Israelis may have attempted to make use of this characteristic in an effort to disable tanks without destroying them (with the ultimate objective of capturing and repairing these tanks for their own use).

29. (U) *Aircraft Shelters in Egypt*, Major Dekel, IDF, undated, SECRET.

SECRET

SECRET

(S) In December 1973, the IAF conducted tests at Fayid to evaluate weapon effectiveness against these shelters.³⁰ The following ordnance was tested: 500-pound MK 82, 750-pound M-117, and 1,000-pound MK 83 GP bombs; 2,000-pound MK 84 HOBOS EO guided bombs; MAVERICK EO guided missiles; and ZUNI rockets. These munitions were dropped or fired from aircraft against two shelters: an underground type and a single, above-ground shelter with openings at both ends. Some of the significant findings of the test are listed below:

- (1) Both types of shelters are difficult to hit with ballistic bombs even under optimum (i.e., test) bombing conditions. Six direct hits were recorded with 47 bombs.
- (2) The above-ground shelters are vulnerable to direct hits from all ballistic bombs tested, but the lethal radius for near-miss damage is small (less than 5 meters for 1,000-pound bombs) except in front of the doors (up to 10 meters).
- (3) The underground shelters are not vulnerable to direct hits from bombs smaller than 1,000 pounds and of doubtful vulnerability to 1,000-pound bombs. Near misses are only effective near the entrance, where impacts within 2 meters will collapse the doors.
- (4) Neither the ZUNI rocket nor the MAVERICK is effective against either type of shelter except for the doors.
- (5) Both types of shelters are vulnerable to hits by HOBOS. However, the contrast afforded by these shelters is very poor for terminal guidance of these EO bombs—except for the entrance, where it is excellent. The use of camouflage nets over the entrance would reduce the available contrast significantly.

(S) There are two important lessons to be remembered from the Israeli combat and test experience: (1) defended aircraft shelters are effective in reducing the vulnerability of aircraft on the ground—a capability that should be fully exploited for friendly air forces; and (2) efforts to destroy enemy aircraft in defended shelters are not likely to prove fruitful with present munitions.

G. AIR-TO-AIR COMBAT

(S) Because of their inability to destroy Arab aircraft on the ground, the Israelis were forced to counter the Arab air threat in air-to-air combat. Although there is conflicting data as to total air-to-air losses for both sides, computations based on the worst-case figures for the Israelis result in an exchange ratio of over 40 to 1 in favor of the IAF. In order to identify the factors that contributed to this overwhelming Israeli victory, an analytical comparison of aircraft performance and weapon system capabilities was conducted.

30. (U) *The Attacking of A/C Shelters in Fayid*, IAF Headquarter Operations Research Branch, Test Report 5-73, undated, SECRET.

SECRET

SECRET

(C) The backbone of the Arab air forces was the Soviet FISHBED-J (MIG-21), a supersonic day fighter capable of carrying four AA-2 ATOLL infrared (IR) guided missiles and one 23 mm cannon.³¹ Against this threat the Israelis launched (1) the French MIRAGE IIC, armed with two U.S. AIM-9D/G SIDEWINDER missiles or an Israeli-manufactured equivalent called SHAFRIR, and a 30 mm cannon; and (2) the U.S. F-4E—some equipped with leading edge slats (LES) to improve turning performance—armed with up to four AIM-9D/G SIDEWINDERS, up to four AIM-7E-2 SPARROWS, and a 20 mm cannon.

(S) Comparison of the performance of the F-4E/LES and the FISHBED-J reveals that the aircraft are approximately equal at altitudes at which most air-to-air combat occurs (see Table 20 for a detailed comparison). Comparison of the aircraft weapon systems reveals that the AIM-9D/G SIDEWINDER has a larger launch envelope than the IR version of the AA-2 ATOLL.³² There is no evidence that the radar version of the ATOLL was supplied to the Arabs; therefore, they did not possess any equivalent to the U.S. AIM-7E-2 SPARROW. The Israelis launched relatively few SPARROWS because of identification problems at long ranges and because they are less effective than SIDEWINDER at close-in ranges.

Table 20 (S). Performance of the Soviet FISHBED-J and FRESCO-D Relative to the U.S. F-4E (with Leading Edge Slats)

[Plus sign (+) denotes advantage for F-4E]

<i>Performance Factors</i>	<i>FISHBED-J (MIG-21)</i>	<i>FRESCO-D (MIG-17)</i>
TR_S (deg/sec)—maximum sustained turn rate at 25,000 feet. $TR_S < 1$ denotes relative equality.	+0.8	+0.6
TR_I (deg/sec)—maximum instantaneous turn rate at 15,000 feet. $TR_I > 2$ denotes significant advantage.	-0.4	-3.7
P_S (ft/sec)—specific excess power at 25,000 feet. $P_S > 200$ denotes definite advantage.	+30.0	+390.0

Source: *Tactical Aircraft Net Technical Assessment*, Volume I, "Summary," 023-35-7800, May 1973, SECRET.

31. (U) *Modern Sino Soviet Fighter Aircraft*, DIA-240-93-73, October 1973, SECRET.

32. (S) The IR ATOLL is equivalent to the AIM-9B, an early model SIDEWINDER that has a very limited capability against maneuvering targets.

SECRET

SECRET

(S) The airborne intercept radar equipment of the Israelis was superior in acquisition and tracking range to that installed in the Arab aircraft. This could have favorably influenced the positioning of Israeli aircraft at the beginning of air-to-air combat but, with the weapons employed, would have exerted no further influence as the dogfight developed. It is also known that the aircraft used by the Arabs were more vulnerable to damage from weapons than were the Israeli aircraft.

(S) When both aircraft performance *and* weapon system capabilities are compared, the F-4E/LES has a definite advantage in both standoff and close-in engagements. Assuming that each side has approximately equal benefit of ground control intercept (which is probably representative of the average situation during the October 1973 War), a three-to-one exchange ratio in favor of the Israelis could be expected.³³ Although the F-4s were used primarily as deep strike aircraft, they destroyed 62 Arab aircraft in air-to-air combat while losing only 3 Israeli aircraft.³⁴ Thus, the actual exchange ratio was over 20 to 1—far in excess of that which was predicted based on equal pilot skills. This superiority can probably be attributed to the excellence of the Israeli pilot skill (see Section H below) and to other less tangible reasons such as motivation.

H. AIRCREW TRAINING

(S) In large measure, the superiority of Israeli pilots in air-to-air combat can be traced to differences between the Israeli and Arab selection and training procedures. The IAF is very selective in its initial pilot screening. Then, during the actual training program, the washout rate for Israeli trainees is 75 percent,³⁵ while it is only 50 percent for Egyptian trainees.³⁶ The flight time in the basic flying schools is roughly equivalent for the Israelis and Egyptians—about 170 sorties (170-175 hours) and 160 sorties (163 hours), respectively.

(S) The major differences occur in the advanced schools and during continuation training with the operational squadrons. Israeli pilots fly about 240 sorties per year (approximately 200 hours); and while Egyptian policy specifies 150-180 hours per year with a 100-hour minimum, the Egyptian pilots actually only flew 60-70 hours per year prior to the October 1973 War. The quality of this continuation training probably differs also. When in a squadron, Israeli pilots are critiqued, through the use of gun camera film, after every mission. Pilots not performing up to standards are removed from the squadron; those performing exceptionally well progress from A-4s to MIRAGEs and F-4s. Squadron commanders are picked from among the most skilled pilots.

33. (U) *Tactical Aircraft Net Technical Assessment*, Volume I, "Summary," 023-35-7800, May 1973, SECRET.

36. (U) "Egyptian Pilot Training," undated DIA notes.

SECRET

SECRET

(S) A comparison of the Israeli and U.S. training programs is difficult because the IAF sorties are generally much shorter than those of the USAF.³⁷ Further, the IAF pilot is not required to meet as many requirements as is his USAF counterpart. IAF aircrews fly about 240 sorties (200 hours) per year, of which 70 percent are dedicated to air-to-air maneuvers in the F-4E squadrons. The USAF requires between 100 and 115 sorties per year (200-220 hours), of which 14-20 percent are air-to-air training sorties (Table 21).

Table 21 (S). U.S. and Israeli Annual Training Sorties Flown

Type of Sortie	U.S. TAC	USAFE	Israeli Air Force		
	F-4		F-4	MIRAGE	A-4
Air-to-Air Dogfight	16 (16%)	12 (11%)	150 (62%)	168 (70%)	84 (35%)
Air-to-Air Gunnery	4 (4%)	4 (3%)	18 (8%)	24 (10%)	12 (5%)
Air-to-Ground and Other	80 (80%)	98 (86%)	72 (30%)	48 (20%)	144 (60%)
	<u>100 (100%)</u>	<u>114 (100%)</u>	<u>240 (100%)</u>	<u>240 (100%)</u>	<u>240 (100%)</u>

(S) Soviet training is accomplished as part of a 4-year college-level education leading to a commission and an engineering degree. Each school is dedicated to producing pilots qualified for one type of flying (i.e., air defense, tactical aviation, strategic forces). At graduation the new pilots have flown about 210-220 hours—essentially the same as USAF pilots—of which one-half was solo time. After graduation the pilot remains in units dedicated to the mission emphasized at the school he attended. A Soviet pilot in an operational unit is programmed to fly between 80 and 120 hours per year, with a 60-hour minimum.³⁸ Arab continuation training compares favorably with that of the Soviet program in annual hours flown. However, it is not possible to evaluate the relative training effectiveness of these hours.

(U) Table 22 compares the Egyptian, Israeli, Soviet, and U.S. training programs.

(U) A meaningful comparison of U.S. and Soviet capabilities based on information gathered in the October 1973 War cannot be made. Although Egyptian aircrew training was based to a large extent on Soviet procedures, and Israeli training in some instances used modified U.S. procedures, there are too many differences in scenarios, mission requirements,

37. (U) Because of geographic differences, USAF training sorties are generally required to spend longer time in transit between bases and restricted training areas.

38. (C) *Cockpit Intelligence #6*, USAFERP 200-1, September/October 1973, p. 8, CONFIDENTIAL.

SECRET

SECRET

Table 22 (S). Comparison of Egyptian, Israeli, Soviet, and U.S. Training Programs

	Egyptian		Israeli		Soviet		U.S.	
	Hours	Length (wks)	Hours	Length (wks)	Hours	Length (wks)	Hours	Length (wks)
Preflight	18	23	10	32				
Primary	65	20	80	16			90	
Basic	80	24	80	16			120	
	163	67	170	64	220	208	210	49
Advanced		12-16*	80	16	Accomplished in Operational Squadrons		98	24
Annual	60-72†	52	200	52	60-70‡	52	200-220	52

*Does not include combat crew training.

†Programmed training is 150-180 hours per year, with 100 hours per year minimum; 60-72 hours per year is the actual time flown prior to the October 1973 War.

‡Programmed training is 100 hours per 130 sorties, with actual average of 80 sorties per year.

and motivation to draw reliable conclusions for a comparison based on training similarities. Nevertheless, an increase in the flying skills of U.S. pilots in air-to-air combat could have high payoffs.

I. AERIAL RECONNAISSANCE/SURVEILLANCE

1. Resources, Characteristics, and Activity

(S) Major resources available for conducting aerial reconnaissance and surveillance of the Israeli and Arab combat areas consist of the following (see Table 23 for details):

<i>Israel</i>	<i>Egypt</i>	<i>Syria</i>
6 RF-4Es	6 FITTERs (recon)	4 FISHBED-Hs
2 MIRAGE IIICs	6 FISHBED-Hs	
10 FIREBEE 124I drones	2 MIRAGE IIIRs (Libyan)	
1 EC-97		

In addition, at least one SR-71A and four MIG-25 FOXBAT high performance aircraft were used by the United States and the Soviet Union, respectively. The United States and Soviet Union also made use of their own reconnaissance satellites.

(U) While actual reconnaissance results or capabilities are not available for comparison, it appears that both sides had or could have had access to reconnaissance platforms with similar speed/altitude capabilities. Major differences are in the longer radius

SECRET

Table 23 (S). Aerial Reconnaissance/Surveillance Resources Used in Israeli/Arab Combat Areas

Platforms	Major Characteristics	Activity During War	Remarks
Israel			
6 RF-4Es	Aircraft with Mach 2 capability at 60,000 feet or Mach 1.2 at sea level. Maximum subsonic radius approximately 600 nmi. Usually equipped with 24-inch KA-93 camera.	113 sorties (44 Suez Canal, 42 Syrian front, 9 Lebanon, 7 Gulf of Suez, 5 Jordan, 4 Egypt west of front, 2 Israeli-held Sinai).	None lost during war; one lost after war while overflying Egypt. Aircraft usually flown at high speed at 300 feet or 60,000 feet.
2 MIRAGE IIICs	Aircraft with Mach 2 capability at 60,000 feet or Mach 1.1 at sea level. Maximum subsonic radius approximately 600 nmi.	51 sorties (34 Suez Canal, 8 Jordan, 6 Syrian front, 2 Gulf of Suez, 1 west of Canal).	None lost during war. Aircraft usually flown at high speed at 60,000 feet on shallow-penetration missions.
10 FIREBEE Drones (1241)	Drone with Mach 0.9 capability at sea level to 50,000 feet. Maximum endurance at 50,000 feet approximately 1 hour. Usually equipped with 24-inch KA-93 camera.	22 sorties launched; 11 successful (8 Suez Canal, 2 over Damascus, 1 Cairo/Nile Delta area).	Six drones lost during war (2 by SAMs, 2 by Israeli ECM interference, 1 by aircraft, 1 by mechanical failure). Usually flown at 2,000 feet and 35,000 feet.* However, altitudes varied from 600 to 50,000 feet. One drone evaded 11 SAMs before being hit by 12th.
1 EC-97	Relatively old propeller-driven aircraft transport equipped with ELINT and mapping radar.	Used only once or twice during war.	Limited capability due to low antenna gains and mapping accuracy. Aircraft flight limited to geographical area of Israel.
Reconnaissance Satellites (U.S.)	No data.	Frequency of activity not available.	
Egypt			
6 SU-7 FITTERS	Aircraft with Mach 1.6 capability at 40,000 feet or Mach 0.8 at sea level. Subsonic radius approximately 200 nmi.	No data.	
6 MIG-21 FISHBED-Ns	Aircraft with Mach 2 capability at 50,000 feet or Mach 1 at sea level. Subsonic radius approximately 300 nmi.	No data.	
4 MIG-25 FOXBATS (USSR control)	Aircraft with Mach 3 capability at 80,000 feet. Maximum supersonic radius approximately 600 nmi.	Estimated to have been used three times during war.	Based at Cairo west airport.
Syria			
4 MIG-21 FISHBED-Hs	Same as Egyptian FISHBED-H.	No data.	

*Data From the October 1973 Middle East War, Volume IV, "Air Operations," WSEG Report 237, October/November 1974, SECRET NOFORN (Except Israel).

SECRET

95

SECRET 25X1

25X1

25X1

SECRET

or endurance capabilities of the U.S.-supplied aircraft relative to the Soviet-supplied aircraft and in the Israeli use of reconnaissance drones.

(S) The Israeli effort averaged 10 sorties per day (or 1 reconnaissance sortie for every 40 strike sorties) during the war, with 60 percent performed by RF-4Es, 30 percent by MIRAGE IIICs, and 10 percent by FIREBEE drones. The EC-97 was used only once or twice due to its poor capability. Relatively few sorties were flown by either the SR-71A or MIG-25 FOXBAT. Satellite reconnaissance appears to have been active almost daily, at least for the Soviet Union.

2. Effect of Ground-Based Air Defense

(S) No manned Israeli reconnaissance aircraft was lost during the war, although one RF-4E was downed by the last of 13 SAMs fired at it while overflying Egypt after the war. Six drones were lost during the war—three due to enemy action (one is reported to have survived 11 SAMs before the 12th one downed it). Two more drones were lost after the war. At least one Egyptian reconnaissance aircraft is reported to have been shot down during the war.

(S) The intensive levels of air defense caused the reconnaissance platforms to operate at high altitudes and long standoff ranges. This resulted in serious degradations in the quality of photo reconnaissance achieved by the Israelis.

3. Timeliness of Intelligence From Aerial Reconnaissance

(S) Lack of timeliness of information collected through aerial reconnaissance has been and remains the single greatest impediment to the application of this intelligence for successful tactical strike planning.³⁹ Response times ranged typically from several hours to half a day. Camera-equipped drones appear to have been of particularly limited use during the war due to the time required to recover them and to transport film by helicopter to processing facilities. The principal value of aerial reconnaissance appears to have been for strategic planning and damage assessment of fixed installations, since these are less fluid situations than are usually encountered on the tactical battlefield.

J. ELECTRONIC WARFARE

(S) The most important application of electronic warfare in the October 1973 War was the Israeli use of electronic countermeasures (ECM) to penetrate and survive the intense Arab air defenses. The Israelis used equipment supplied primarily by the United States, and they employed tactics that reflected recent U.S. experience in Southeast Asia. This was the first time that U.S. equipment was used in such a sophisticated air defense—one that included several weapon systems not previously engaged (the ZSU-23-4 AAA weapon, and the SA-3 and SA-6 SAM systems).

39. (S) To improve the value of aerial reconnaissance for tactical strike planning, the Israelis state that a real-time reconnaissance system is required to allow for rapid acquisition of mobile, time-sensitive targets.

SECRET

SECRET

(S) A variety of both active and passive elements of the electronic warfare mix was employed by the Israelis. Extensive use was made of active jamming by (1) ECM pods carried onboard penetrating aircraft for self-protection and (2) support jamming provided largely by helicopters in a standoff role but also by ground-based jammers. Passive electronic warfare elements that were employed included chaff and radar-warning receivers.

1. Onboard Electronic Warfare Systems

(S) At the beginning of the October 1973 War, the IAF had the following U.S.-supplied onboard ECM pods: ALQ-71, ALQ-87, and ALQ-101-6. (More modern U.S. equipment, the ALY-119-7, was provided during the last days of the war.) These three pods were incapable of simultaneously covering all the frequencies presented by the Soviet-supplied AAA and SAMs. Also, there were insufficient quantities of pods to protect all IAF aircraft, especially in the early days of the war. There was no effective protection available against the highly mobile SA-6 or the ZSU-23-4.

(S) The Israeli aircrews had very limited knowledge in the proper use of electronic warfare equipment. This deficiency in their training was in part intentional—in order that the electronic warfare equipment would not be compromised if the crew were captured—and in part due to the fact that some of the equipment had been only recently introduced.

(S) Passive onboard equipment included radar warning receivers. The U.S. APR-36 and -37 were installed on some F-4 and A-4 aircraft, and an Israeli-manufactured system was used on the MYSTERE aircraft. Due to the very high density of threat signals, it is not believed that this equipment was of much help.

2. Support Jamming

(S) Jamming in support of the IAF was provided against the Arab SAMs by airborne standoff jamming (SOJ) platforms and by ground-based jammers. A typical configuration of primary equipment carried onboard the CH-53 helicopter, which provided most of the airborne SOJ support,⁴⁰ included ALT-6Bs and ALT-27s. These were used to counter the target tracking radars associated with the SA-2B/F, SA-2C/E, and SA-3, and both the target tracking and the acquisition radars associated with the SA-6. Additional jamming support against the acquisition radars associated with the SA-2 and SA-3 (SPOON REST and FLAT FACE, respectively) was provided by various other jammers. All of these units were mounted on pallets to facilitate the use of the jamming equipment onboard several available platforms.

(S) Passive equipment was also utilized. Receivers onboard SOJ platforms functioned to determine the transmitting frequencies and other characteristics of the Arab radars, and to find the direction from which the radar emissions were emanating. This information was used to help allocate and control the jamming resources. However, this passive gear could not be used simultaneously with the active jammers.

40. (S) A limited number of TA-4s were also used in an SOJ role.

SECRET

SECRET

(S) The airborne SOJ platforms were generally positioned along the ingress corridor for the penetrating strike aircraft. The SOJ helicopters operated at an altitude of about 7,000 feet and were located in direct proximity to, but generally out of range of, the Arab SAM systems. It is believed that one CH-53 helicopter that was operating in the SOJ role was lost to an SA-2 missile.

(S) The jamming power available for airborne SOJ was generally low. The Israelis attempted to increase the total support jamming power available to deploying the airborne platforms as close to the threat systems as was safely possible, by using several airborne platforms, and by using ground-based jamming equipment.

(S) The Israelis took advantage of favorable terrain in both the Sinai and the Golan Heights to establish a good line-of-sight between the Arab SAM systems and the Israeli ground-based jammers. Jamming provided in this manner constituted about half of the support jamming.

3. Chaff

(S) Chaff was used extensively by the Israelis against all Arab air defense units, including the SA-6. The Israeli chaff included ALE-29 (internally mounted on some A-4s) and a limited number of ALE-37 chaff dispensing pods (also for the A-4s), in addition to chaff delivered by artillery, rockets, and bombs. During the last days of the conflict, the United States provided ALE-38 pods for use with the F-4. Since a significant number of A-4 and F-4 aircraft did not have the onboard equipment for dispensing chaff, the Israelis adopted the U.S.-developed technique of placing chaff in the speed brakes. Of course, chaff can be deployed only once using this technique.

(S) Chaff was frequently deployed for self-protection just prior to weapon delivery maneuvers. Artillery-, rocket-, and bomb-delivered chaff was used for general strike support to create chaff clouds and to confuse Arab air defenses. The Israelis also deployed MQM-74 chaff-dispensing decoy drones to draw SAM fire during a strike ingress and to saturate the enemy air defenses. All 25 of these drones were lost early in the war.

SECRET

SECRET

Chapter IV

THE SEA WAR

(U) The missions of the Israeli Navy in the October 1973 War were to protect the littoral (coastal region) from sea-launched attack and landings, participate in interservice activities, protect sea lanes of communication and waterborne logistics in the Mediterranean, and interdict and bombard shore targets.

(U) The main naval weapon system used by the Israelis during the war was the small, high-speed SAAR class missile boat armed with the Israeli-built GABRIEL surface-to-surface missile. Modified U.S.-built SWIFT boats were used in the Red Sea for harbor patrol and commando operations. The commando forces also had several configurations of the 28-foot Bertram speedboat.

(C) The naval weapon system used by the Arab navies in both the Mediterranean and Red Seas was the smaller, high-speed OSA and KOMAR class missile boats armed with the STYX surface-to-surface missile. Egyptian submarines were active in both the Red Sea and the Mediterranean. Two Egyptian destroyers and a frigate were involved in the blockade of Bab el Mandeb Straits.

(S) No seaborne landings were attempted by the Arabs on Israeli territory. Some sea-launched attacks, largely ineffective, were made by the Egyptians on Israeli-held positions in the Sinai. Developments during the conflict precluded interservice activities. Protection of shipping caused concern for the Israeli government throughout the war. The SAAR missile boat, which is the largest combatant in the Israeli Navy inventory, has relatively short range and endurance, no ASW capability, and marginal AAW capability. Its role as an escort was therefore limited to selected shipping east of Crete. The Israeli Navy conducted numerous attacks against Egyptian and Syrian coastal installations for interdiction and harassment.

(S) The Israeli Navy was notably successful throughout the conflict, largely because of their aggressive and skillful execution of a basic naval strategy—seek and destroy the enemy. During the 18-day conflict, Arab naval forces lost 17 craft. A total of 49 GABRIEL missiles, launched from SAAR missile boats, sank or damaged five Arab craft; three neutral merchant vessels were also sunk or damaged by GABRIEL missiles. Five other Arab craft were sunk or damaged by commando raids. One more GABRIEL (for a total of 50) was fired at an Egyptian coastal radar site and was considered a probable hit.

SECRET

SECRET

(S) The Arab navies fired 50 to 56 Soviet-built STYX missiles from Egyptian and Syrian OSA/KOMAR missile boats. In addition, four or five SAMLET missiles and one SA-2 were launched from coastal installations in Alexandria; none of these hit its intended target. The Israelis suffered no losses to their vessels.

(U) Table 24 presents the order of battle of the Israeli Navy. Table 25 presents the Egyptian and Syrian naval orders of battle and their losses.

A. MISSILE BOAT ENGAGEMENTS

Table 24 (S). Israeli Naval Order of Battle

(S) There were four missile boat engagements in which GABRIEL and STYX missiles were exchanged. Two of these engagements occurred in the open sea—one west of Latakia, Syria, on the night of 6-7 October, and the other north of Damietta, Egypt, on the night of 8-9 October. The other two missile boat engagements were fought near the entrance of the Syrian harbors of Latakia and Tartus on the nights of 10-11 and 11-12 October, respectively. All Arab losses credited to the GABRIEL occurred during the open sea engagements between 6 and 9 October. Three neutral merchant ships anchored in Syrian harbors were also hit by GABRIELS.

Type	Mediterranean	Red Sea
SAAR I*	2	0
SAAR II	4	0
SAAR III	6	0
SAAR IV†	2	0
SWIFT boats	5	13
Small craft	3	7
Total	22	20

*One of the SAAR I boats, INS *Miznak*, was upgraded to SAAR II class by the addition of missiles.

†Since the conclusion of the war, two additional SAAR IVs have been commissioned. Two others are still under construction. In March 1974 the Israeli Navy transferred two SAAR IVs to the Red Sea.

(S) In addition to the four previously mentioned engagements, there were three other missile boat interactions during which only one side fired surface-to-surface missiles. No hits were scored, and rapid disengagement followed. One of these battles deserves special mention because two SAAR boats encountered problems launching their GABRIELS; also, it was the only battle in which air support was requested by the Israeli Navy. On the first night of the war, 6-7 October, two SAAR boats encountered Egyptian missile boats northeast of Port Said. One SAAR launched five GABRIELS, all of which missed their targets because of a radar misalignment problem; the other SAAR launched six GABRIELS, all of which missed because of operator error.¹ Following these misses, the SAARs requested and received air support. One OSA was sunk by a 500-pound bomb delivered by an A-4 aircraft during the engagement. Several Egyptian crew members were later captured.

(S) All missile boat actions took place at night in Egyptian and Syrian waters. Night action was probably planned by the Israelis to minimize chances of detection by the

1. (C) The missiles were launched by manually overriding the fire control computer.

SECRET

SECRET*Table 25 (S). Egyptian and Syrian Naval Orders of Battle and Losses*

Type	Egypt				Syria	
	Mediterranean		Red Sea			
	Start of War	Sunk/Damaged	Start of War	Sunk/Damaged	Start of War	Sunk/Damaged
Submarines	10	0	2	0	0	0
Destroyers	3	0	2	0	0	0
Frigates	2	0	1	0	0	0
Missile boats						
OSA	12	2/2	0	0	3*	1/0
KOMAR	1	0	4	0/3	6	2/0
Torpedo boats	28		6	0/0	13	
P-6		1/0				
P-4				1†		1/0
Small craft						
LCT	11	0/1	3			
T-43 (MSF)	9	0	1	0	2	1/0
Other				2/0‡		
	<u>76</u>	<u>3/3</u>	<u>19</u>	<u>3/3</u>	<u>24</u>	<u>5/0</u>

*Since termination of hostilities, Syria has received four more OSAs.

†Captured by Israeli forces at Suez.

‡NISR class coast guard boats (similar to SWIFT boats)—one destroyed at Suez and the other destroyed at sea.

opposition and to reduce the danger from air attack. Environmental conditions during the conflict were good—clear weather, calm seas, and more than quarter moon. Radar ducting produced relatively long detection ranges of surface targets.

B. MISSILE BOAT TACTICS

1. Israeli Navy SAAR Tactics

(S) The Israeli Navy had conducted intensive training of their SAAR crews in simulated engagements similar to those that actually occurred during the October 1973 War. Tactics were developed and exercised on a digital tactical simulator and in at-sea exercises.

rapid bloom overhead chaff (RBOC), the ULQ-6 deceptive ECM repeater, noise jammers, and studies and simulations of SS-N-2 (STYX) engagements. They had also had access to

25X1

25X6

SECRET

SECRET

25X6

[redacted] The general opinion of the Israeli Navy was that the engagements unfolded as expected from their training exercises.

(S) To compensate for the 10-mile range advantage of the STYX over the GABRIEL, planned Israeli Navy tactics called for coordinated air/sea attack against the OSA/KOMAR forces. Israeli Air Force (IAF) aircraft were to have attacked the OSA/KOMAR while the SAAR units were beyond STYX range (22-25 miles) and kept them occupied while the SAARs closed to GABRIEL range (10-12 miles) under cover of long-range chaff (AVSHALOM). This planned tactic was not used due to requirements on the IAF aircraft to support land combat missions. However, in case of emergency, IAF aircraft could have been diverted to help the Israeli Navy.

(S) Training had also been conducted for an alternative tactic that was predicated on engagement without air support. This was the tactic that was used by the Israeli Navy throughout the war. The SAAR boats operated in pairs, with about a mile between vessels and about 7,000 yards' separation between pairs. The Israeli Navy preferred committing four to six units per group to maintain good command and control. An attempt was made to keep the front (line abreast) aligned generally perpendicular to the threat axis. Israeli Navy tactics called for maintaining strict emission control (EMCON), with occasional surface radar sweeps made by the senior boat. The electronic support measures (ESM) receiver, looking primarily for SQUARE TIE emissions, was regarded as the first-detection sensor. Real-time COMINT information relayed from short intercept stations was also utilized to determine, to some extent, the opposition's intentions. The SAAR search radar supplemented ESM detection of surface craft and missiles. Upon ESM detection of the SQUARE TIE radar, or radar detection of OSA/KOMAR, the OTC would direct a coordinated launch of AVSHALOM decoy chaff via UHF voice communications. AVSHALOM was launched at an angle of about 30 degrees from the threat bearing at approximately 6 miles downrange.

(S) If the airborne STYX appeared to home on the decoy AVSHALOM, no further Israeli Navy antiship missile defense was employed. If, however, ESM indicated acquisition of the boat by STYX seeker, or if a missile appeared headed for a SAAR, the following procedure was employed:

- (1) At missile range to boat of 26,000 yards, the SAAR turned toward the missile to present the smallest radar cross section, and launched self-defense chaff (AMNON) at approximately 8- to 10-second intervals. Chaff mortar rounds were fired downwind, bursting at an altitude of about 300 feet and at a range of about 1,000 feet from the launcher.
- (2) The SAAR increased speed to maximum, and those boats so equipped energized deception repeaters and noise jammers.
- (3) The incoming missile was engaged with guns as soon as range permitted. All guns were used in the self-defense role, including the 76 mm OTO MELARA and the 40 mm, 20 mm, and 50 caliber machine guns. The SAAR continued to

SECRET

SECRET

close the threat (usually a tail chase situation at this point) until within GABRIEL range, and then launched weapons. Israeli Navy doctrine called for launching two GABRIELS at a designated target. If a target was damaged but not sunk by GABRIEL strikes, the SAAR III and IV boats attempted engagement at about 6,000 to 8,000 yards with the 76 mm guns, and at 4,000 yards with the 40 mm guns.

(S) Reports from Israel shortly after the war indicated that some SAAR boats successfully used terminal evasive maneuvering against incoming STYX missiles. Later reports (after reconstruction) said that in no case were last ditch terminal maneuvers attempted by the SAARs. Indeed, the Israeli Navy said that terminal maneuvers are specifically excluded from their standard operational doctrine because, otherwise, the SAARs would present a larger radar cross section to the incoming STYX. (The small radar cross section presented by the bow aspect was further reduced by the use of radar absorbing material on the mast and forepart of the superstructure.)

2. Arab OSA/KOMAR Tactics

(C) The Arab missile boat tactics are believed to have been derived from standard Soviet operational doctrine. STYX attacks against merchant or large combatant ships are described in DIA publications. The preferred standard tactic for use against small patrol boats is not known.

(S) The actions of the Arab OSA/KOMAR forces during the war suggest that the following tactics were employed:

- (1) The SAAR force was detected by coastal search radars or by the OSA/KOMAR SQUARE TIE radar.
- (2) The OSA/KOMARs then headed toward the threat in a line-abreast formation with spacings of 500 to 1,000 yards.
- (3) As soon as targets were confirmed by SQUARE TIE, the OSA/KOMARs prepared to launch missiles. (This requires that the boats maintain a constant heading for 2 to 3 minutes while stabilizing the missile gyro reference system. Although it could not be confirmed, it appeared to the Israelis that, in some cases, the OSA/KOMARs executed missile launch without maintaining a constant heading.)
- (4) The OSA/KOMARs then fired one or two missiles per target, after which they disengaged using land clutter to aid their escape.

Following the setbacks in the at-sea encounters early in the war, the Arabs apparently abandoned their planned tactics and resorted to firing at the Israeli Navy craft from protected harbors under the cover of foreign merchant ships.

(S) The planned defensive tactics of OSA/KOMARs against missile attack are not known. There is no indication that the Egyptian and Syrian boats had chaff, noise jammers,

SECRET

SECRET

or deception repeaters. There are also no indications that the OSA/KOMARs ever used their guns in either the offensive or defensive role.

C. COMMAND, CONTROL, AND COMMUNICATIONS

(S) The Israeli Navy SAAR flotilla was organized into four divisions, each under the control of a division commander who may also have commanded one of the SAAR boats in his division. The flotilla commander, a captain, was onboard a SAAR and exercised direct control during several missions. Direct communications were maintained among all at-sea units, Israeli Navy headquarters in Tel Aviv, and the SAAR flotilla at Haifa. This communications link was considered necessary in order to ensure that neutral or friendly ships were not attacked. After impressive naval successes during the first 2 days of fighting, full authority to plan and execute all SAAR operations was granted to the Haifa Naval Command. However, Israeli Navy headquarters maintained the means to override the on-scene commander's decision and, through direct communications or relay, could monitor operations. The Israeli Navy reported that decentralized command was an important factor in the success of Israeli Navy operations.

(S) Immediately after the war, Israeli Navy sources stated that Arab forces utilized jamming tactics against HF shore-based communications sites with marginal success. Following reconstruction, the Israeli Navy reported that what was thought to be HF link jamming was due to atmospheric. Shipboard tactical communications remained relatively unhindered, using UHF plain language with few code words. Information on Israeli Navy use of communications jamming is not available.

(S) Command and control during an engagement was a problem for the Israeli Navy. It was reported that in one engagement a GABRIEL launched by one SAAR was believed to have been shot down by 20 mm gunfire from another SAAR. Targeting often presented the problem of more than one SAAR firing at the same target, resulting in a waste of GABRIELS.

(S) Egyptian OSA/KOMARs were reported by the Israeli Navy as working in a coordinated fashion under control from shore at all times. Almost continuous communications were maintained with shore stations via HF radio. Surveillance information was provided by coastal radars, other naval vessels, and armed fishing boats. Information on Syrian boat control and communications is not available. It is assumed that the Syrians maintained communications via HF and also relied heavily on coastal radars for intelligence.

D. EFFECTIVENESS OF ISRAELI NAVY ANTISHIP MISSILE DEFENSE

1. STYX Performance

(S) The OSA/KOMAR missile systems were completely ineffective against the Israeli Navy. Fifty to fifty-six STYXs were launched against SAAR boats on seven separate occasions during the war without scoring a single hit. This conflicts sharply with the

SECRET

SECRET

effectiveness obtained in previous STYX combat launches. In sinking the *Eilat* in 1967, three out of four STYXs hit the ship. In the Indo-Pakistani War of 1972, nine STYXs were launched and eight hit their targets.

(S) This dramatic reversal in the performance of the STYX missile system can be attributed to several critical factors:

- (1) Israeli Navy units were equipped with electronic warfare (EW) systems designed specifically to counter the known STYX threat.
- (2) The SAAR boats were small, fast units. Speed, maneuverability, and a small radar cross section placed them in the "marginal target" category for the STYX.
- (3) The Israeli Navy groups were well trained and exercised in the expected battle situations and had the capability, known to their opposition, to strike back with their own missile systems.
- (4) Previous STYX operations had been directed against larger ships, either unarmed or having little capability to close the OSA/KOMAR boats and destroy them.
- (5) The Arabs were not prepared to deal with the threat of ECM and an opponent armed with high-speed missile boats. It appears that Arab training and procurement had not adjusted to this threat. They exhibited a lack of capability in target discrimination, identification, and selection, being deceived by decoys. Also, they were unable to capitalize on the two-to-one range advantage of the STYX over the GABRIEL.

2. Effectiveness of Israeli Navy Electronic Warfare

(S) The factor that contributed most to the success of the Israeli Navy in defeating the STYX missile was the judicious use of EW. The SAAR boat EW suite included an ESM receiver, long-range chaff, and self-defense chaff. Only four SAARs were equipped with noise jammers; two SAARs were equipped with deception repeaters.

(S) Quantitative information on initial detection, target tracking, and identification is sparse. The Israeli Navy relied heavily on ESM equipment for initial detection. The SAARs were able to detect the SQUARE TIE radar emissions at 20 to 30 miles on most occasions and to obtain threat bearings. The frequent failure to practice EMCON discipline in the Arab OSA/KOMAR forces and the long-range radar propagation conditions that normally prevail in the Mediterranean benefited the Israeli Navy. The attacking SAAR forces were able to get early warning on the locations and intent of the OSA/KOMARs. Real-time COMINT information on Arab missile launch intentions was also relayed from Israeli coastal intercept stations to the SAARs.

(S) Long-range chaff was used very effectively as an alternate target decoy by the Israeli Navy. It was reported that between 40 and 60 percent of all STYX missiles launched were fired at alternate target decoys. It appears that the Egyptian naval command is

SECRET

SECRET

unaware of the use of chaff by the Israeli Navy. The Egyptians thought that the SAAR boats were escorted by missile-armed helicopters and may have mistaken the chaff decoys for these "escorts."

(S) The Israeli tactic of using the combination of self-defense chaff, deceptive repeaters, and noise jammers also proved very effective against the STYX. It is not possible to assess the individual contribution of each element to the success of this tactic. It was reported that on five to seven occasions the STYX was heading toward a SAAR boat and changed course to home on the chaff. It was believed that in these cases the jammers and repeaters caused break-lock. In all other cases where the missiles were launched in the direction of SAARs, they appeared to home on the self-defense chaff.

3. Effectiveness of Self-Defense Guns

(S) The other phase of the Israeli Navy antiship missile defense involved the use of the SAAR's self-defense hard-kill systems. It was reported that three to four STYX missiles were shot down by small-caliber gunfire (50 caliber, 20 mm, and 40 mm guns). It is not known whether these kills came from "target practice" at missiles passing close by the SAARs or were made on missiles headed directly toward the gunners. Therefore, the effectiveness of the self-defense guns cannot be measured quantitatively in terms of saving the intended target. Information on what caused the missiles to fail when hit by gunfire is also unavailable. Apparently only one exploded in flight. The others did not detonate on water impact even though impact-fuzed.

(S) The 76 mm OTO MELARA gun appears to have been ineffective in the antiship missile defense role. Most of the 76 mm failures during the war were due to misfire and extractor malfunctions. Both of these failures tended to occur more frequently at the high rate of fire (80 rounds per minute) desired for antiship missile defense. In addition, since the fire control radar on the SAARs controls both the GABRIEL missiles and the 76 mm guns, it was not always available to control gunfire. The Israelis also expressed dissatisfaction with the Italian-manufactured, U.S.-designed MK 72 VT fuzes that were adapted for the 76 mm rounds.²

4. Effectiveness of GABRIEL Missile

(S) The GABRIEL missile system proved to be effective against its intended targets. According to Israeli sources, a total of 50 GABRIELs were fired during the conflict, scoring 21 hits on Arab targets—an overall hit effectiveness of 42 percent. Forty-nine of the GABRIELs were launched against Arab surface units, scoring 20 hits; the 50th GABRIEL was launched against a shore radar site, achieving a hit. Of the 50 GABRIELs fired, 11 launchings from two SAARs on the night of 6-7 October off the Egyptian coast resulted in misses (five from radar misalignment and six from personnel error). Excluding these 11 misses from the total number of firings, the hit effectiveness measure improves to 54

2. (U) The MK 72 VT fuze was designed over 30 years ago for a 3-inch gun having lower initial velocity and spin rate.

SECRET

SECRET

percent. The Israeli scoring did not count four hits on three merchant ships near OSA/KOMAR boats. A best estimate based on all-source information credits the Israeli Navy with 11 hits on Arab surface craft, 1 probable hit against a shore target, and 6 hits on three merchant ships out of 50 GABRIELs fired. These statistics yield an overall hit effectiveness of 36 percent, or 24 percent if the hits on the merchants are excluded.

(S) The GABRIEL was designed for performance against small, fast patrol boats as well as larger targets. It has a high probability of hit in the absence of ECM. Neither ECM nor chaff was used by the OSA/KOMARs, presumably because they were not so equipped. Their principal countermeasure appeared to be to run toward shore to take advantage of the effects of land clutter on the SAAR guidance radar. There were two reported instances of OSA/KOMARs escaping this way. The possibility that the Arabs will use ECM in the future is a serious concern to the Israeli Navy, since it would most likely reduce the effectiveness of the GABRIEL considerably.

(S) There were no reports of gunfire defense against the GABRIEL. The KOMAR has no defensive capability against a missile approaching from the rear hemisphere. The OSA has limited capability—a 30 mm gun, reportedly without fire-control radar.

E. OTHER NAVAL OPERATIONS**1. Shore Bombardment**

(S) Egyptian forces conducted several shore bombardment missions against Israeli-controlled territory. Early in the conflict, 122 mm rockets were fired from Egyptian torpedo boats against Israeli positions near Port Said in the Sinai. The remainder of the attacks occurred in the Gulf of Suez and against the Sharm el Sheikh area. In the attacks on Sharm el Sheikh, the Egyptians used both rockets and STYX missiles. No damage was reported in any of these attacks. Syrian forces conducted no shore bombardment against Israel.

(S) Numerous attacks were conducted by Israeli SAARs against Egyptian and Syrian coastal installations in the Mediterranean. These attacks were intended to destroy coastal naval installations and harass the opposition. Principal targets in Syria included oil storage tanks in Latakia and Baniyas and military installations at Mina el Beida. Harassment fire was directed several times against Egyptian coastal installations between Port Said and Ras el Kanayis, west of Alexandria.

(S) One significant incident occurred on the night of 21-22 October. Four SAARs attacked Abu Qir to destroy a ground-control intercept radar station. One boat launched a GABRIEL missile, which probably hit the target. A secondary explosion in the target area was observed and the radar went down. During this operation, the SAARs launched long-range chaff rockets as confusion targets and observed four to five SAMLET surface-to-surface missiles apparently fired from Abu Qir at the decoys. All SAMLETs seemed to home on the chaff.

(S) On many occasions, the SAARs encountered heavy shore fire from 130 mm radar-directed guns. These guns were considered highly accurate by the Israelis. However,

SECRET

SECRET

the SAARs were effective in countering shore gunfire by maneuvering and using short-range chaff.

(S) The primary weapon used by the Israeli Navy for shore bombardment was the 76 mm OTO MELARA gun. An indication of the relatively low reliability exhibited by this weapon in the October 1973 War can be seen in the operational performance data:

Rounds fired	3,122
Misfires	20
Extraction failures	29
Failures resulting from other causes	23
Mean rounds between stoppage ³	43

Most misfires were attributed to faulty primers. Extraction failures resulted from insufficient recoil force. (Although misfires and extraction failures stop the gun, both types of failures can be cleared quickly during an engagement.) No information is available on mean time to repair.

(S) It is difficult to assess the effectiveness of the OTO MELARA in shore bombardment. Detailed damage assessment is not available, although it was reported that POL storage tanks were exploded, with resulting fires. The Israeli Navy was generally pleased with the gun in this role.

2. Commando Operations

(S) Israeli Navy Sea Force Commandos (comparable to the U.S. Navy Seal Teams) conducted five clandestine operations. Four raids were conducted against Egyptian ports in the Gulf of Suez; the fifth raid was conducted against Port Said. These operations were of the following general types:

- Over-beach insertion (one operation)
- Subsurface swimmer attack (two operations)
- Surface small boat attack (two operations)

All operations were of short duration (less than 24 hours) with no resupply required. In all instances, the weather and sea conditions were favorable for operations. None of the operations were preplanned prior to commencement of hostilities, but were tailored to achieve specific objectives during the war. The number of raid participants ranged from a minimum of 4 to a maximum of 24.

(S) The results of the Israeli commando operations can be summarized as follows:

- Two KOMARs were damaged in two different raids on the Red Sea port of Hurghada. One of the boats was damaged by limpet mines; the other by two LAWs (Light Antitank Weapons).

3. (C) The OTO MELARA scheduled for U.S. manufacture has specifications that stipulate 600 mean rounds between stoppage.

SECRET

SECRET

- In the swimmer raid on Port Said (nights of 16-17 October), one OSA, one landing craft, and one P-6 patrol boat were damaged by limpet mines. Two of the four commandos in the raiding party were killed.

The Israeli Navy feels that the repeated attacks against the port of Hurghada (where the Egyptian Red Sea KOMARs are based) effectively prevented Egyptian missile attacks against Israeli military installations along the Gulf of Suez and the Red Sea.

(S) Arab commandos reportedly conducted three attacks on Israeli coastal installations in the Gulf of Suez. Damage was reported as insignificant.

3. Mining Operations

(S) Of the combatants, only Egypt engaged in mining operations. Although Syria has Russian-built mines in its inventory and has a minelaying capability, the Syrians did not engage in mine warfare. Israel had no minelaying capability.

(C) The existence of Egyptian-laid minefields did not become known until after the war, when two incidents involving mines occurred in the Gulf of Suez. On 25 October 1973, in the Strait of Jubal, an Israeli-operated Liberian-flag tanker, the *Sirius* (42,000 tons), was severely damaged by a mine explosion beneath the stern of the ship. A second explosion, apparently triggered by the first, occurred 50 meters off the bow of the ship. The *Sirius* drifted onto a reef and eventually sank. On 10 November 1973, a small oil tanker, the *Cyrenia* (2,000 tons), was slightly damaged by a mine 4 miles west of At-Tur. The explosion was close aboard.

(S) The presence of a minefield extending from the entrance of the Strait of Jubal to the vicinity of At-Tur has since been confirmed. The minefield is believed to contain both Soviet AMD-II-500 and KRAB type mines. It is not known when the field was laid. Although the Israeli Navy was concerned about possible use of mines by the Egyptians, they had no indication about the existence of this minefield before the *Sirius* incident. The Israeli Navy claimed that the area was used by naval craft throughout the war without a mining incident.

(S) Israel relies heavily on oil shipments through the Red Sea and from the Gulf of Suez to Eilat in the Gulf of Aqaba. The importance of resuming oil shipments after the war prompted the Israeli Navy to take rather extreme measures to ensure safe passage through the undefined minefields. Two ships towing noisemakers—one the previously damaged *Cyrenia* and the other a large (40,000-ton) tanker—were used to test the actual location of the field in an effort to define a safe-passage channel. In this risky effort, they were successful in defining such a channel.

4. Submarine and Antisubmarine Warfare

(S) Submarine warfare was conducted only by the Egyptians. Of the 12 submarines in the Egyptian Navy (6 WHISKEY class and 6 ROMEO class), 10 were assigned in the Mediterranean area, where at least 3 were alleged to be at sea at all times. Two submarines were assigned in the Red Sea. Syria has no submarines. Neither of the two Israeli

SECRET

SECRET

submarines (ex-British TANGO class) was deployed at sea during the conflict. They are used primarily as training ships for the crews that will man the three Israeli submarines presently under construction in England.

(S) Three incidents involving submarine operations were reported. On 7 October, three torpedoes were fired at the Israeli-operated Liberian-flag merchant vessel *Samson* while it was steaming south in the Red Sea. All torpedoes missed the target. In the period 20-21 October, Egyptian submarines attempted to intercept the Israeli ship *Hanna*, west and south of Cyprus. The Egyptian effort failed and the *Hanna* arrived safely in Ashdod, Israel. On 23 October, a Greek merchant ship, sailing from Alexandria to Bengazi, Libya, received two torpedo hits and sank about 60 miles north of Alexandria. It is presumed that an Egyptian submarine made this attack.

(S) No antisubmarine warfare operations were conducted by either side in the conflict. Israeli ASW capability is very limited; only six SAARs are equipped with sonar—a retractable, German-made ELAC searchlight sonar with a nominal range of 6,000 yards. Because of this, Egyptian submarines could have posed a serious threat to Israeli-bound shipping had they been utilized effectively.

5. Bab el Mandeb Blockade

(S) At the commencement of hostilities, Egypt undertook a naval blockade in the Red Sea and maintained a near continuous patrol of the Bab el Mandeb Straits. The Egyptian force consisted of one SKORY class DD, one ZULU class DD, one RIVER class frigate, and two ROMEO class submarines. Although this naval action continued after the war (into early December), a significant degradation in its enforcement occurred after 1 November. The age and material condition of the units participating in the blockade imposed constraints on Egyptian operations. These units had been isolated in the Red Sea since the 1967 Six-Day War.

(S) The Egyptian blockade units were essentially on a policing and patrol operation, challenging traffic traversing the Straits of Bab el Mandeb. It has been reported that about 200 ships were challenged while transiting the Straits, and that almost all were allowed to proceed after they identified themselves. On very few occasions, ships were turned around and were not allowed to enter the Red Sea. On 24 October, the U.S. merchant ship *La Salle* was challenged while entering the Straits from the north, and two shots were fired across her bow. The *La Salle* identified herself and was allowed to proceed. The *Samson* incident discussed in the previous subsection is also believed to have been part of this policing action, serving notice that submarines were a threat to Red Sea traffic.

(S) The Israeli forces chose not to challenge the Egyptian blockade; indeed, the Israeli Navy did not have the capability in the Red Sea since all their missile boats were then in the Mediterranean. In March 1974, Israel transferred two SAAR IV boats to the Red Sea, and two additional SAAR IVs are planned for the area.

(C) A report from Egypt states that the Egyptian Navy believes that it is capable of closing the Red Sea to Israeli maritime traffic.

SECRET

SECRET**F. (S) SUMMARY AND CONCLUSIONS**

- Arab forces launched 50 to 56 STYXs, 1 SA-2, and 4 to 5 SAMLET missiles at Israeli Navy SAARs, scoring no hits.
 - Israeli naval losses: none.
- Israeli Navy SAAR forces launched 49 GABRIELs against Arab surface units, scoring 17 hits (11 hits on Arab craft and 6 on three neutral merchant vessels). An additional GABRIEL was launched against a shore radar site, achieving a probable hit. The overall GABRIEL hit effectiveness was 36 percent.
 - Egyptian naval losses: 5 vessels sunk, 6 damaged, and 1 captured.
 - Syrian naval losses: 5 vessels sunk.
- Israeli Navy antiship missile defense equipment and tactics were designed specifically to combat the STYX missile system. The intense training and well-designed tactics of the Israeli forces, the skillful conduct of electronic warfare, and the use of guns combined to defeat the STYX missile system completely.
 - Long-range chaff was effective in decoying 40 to 60 percent of the STYX missiles fired at Israeli Navy surface units.
 - Three to four STYX missiles were shot down by 20 mm, 40 mm, and 50 caliber guns.
 - The combination of self-defense chaff, deception repeaters, and noise jammers was effective in countering the remainder of the STYX missiles that approached the Israeli Navy surface units.
- The Arabs were not prepared to deal with the threat of ECM and an opponent armed with high-speed missile boats. It appears that Arab training and procurement had not adjusted to this threat. They exhibited a lack of capability in target discrimination, identification, and selection, being deceived by decoys. Also, they were unable to capitalize on the two-to-one range advantage of the STYX over the GABRIEL.
- Arab boats did not have (or at least did not use) countermeasures (electronic or chaff) to thwart the SAAR/GABRIEL systems.
- The GABRIEL missile system was designed for use against OSA/KOMAR-type targets, as well as against larger combatants, and proved effective against them in a non-ECM environment. However, the capability of the GABRIEL is limited by its short range and small warhead.
- The STYX proved ineffective against small targets using properly planned countermeasures. However, the STYX was designed primarily for use against merchant and large combatant vessels in an ECM-free environment. Although

SECRET

SECRET

this early version of the STYX, the SS-N-2a, is no longer used by the Soviets, it has been widely exported to many of their allies. Therefore, it can still pose a threat to U.S. vessels in the event of conflict with such a third country.

- The Israeli Navy was satisfied with the performance of the 76 mm gun against shore targets. (Operators preferred the 40 mm against surface craft.) However, the gun was ineffective in the antiship missile defense role against the STYX missiles. Overall, the gun suffered from low reliability: the mean rounds between stoppage for the 76 mm gun was 43. These experiences should be of concern to the U.S. Navy since the 76 mm gun is planned for the PF and the PHM.
- Although Egyptian utilization of submarine warfare was not effective, the submarine threat in a future Arab-Israeli conflict should not be discounted.
- The Egyptian blockade was a success inasmuch as it was not challenged. It added a new dimension to the Arab-Israeli conflict and could become a serious concern in a prolonged war.
- Caution should be exercised in extrapolating the results of the Arab-Israeli missile boat engagements to a scenario involving larger combatants and/or more advanced weapon systems. The results of the STYX-GABRIEL exchanges in the Middle East may not be readily applicable to engagements between the United States and Soviet Union. The orders of battle are entirely different. The SS-N-2a STYX is no longer used by the Soviets. The Soviet Navy currently employs antiship missiles with a variety of ranges and flight profiles, and probably different guidance and homing techniques. U.S. intelligence on many of these missiles is limited.
- Generally, given adequate information about the threat, electronic warfare equipment and tactics can be designed to make antiship missile defense quite effective.
- U.S. and NATO small combatants, operational and planned, should be provided with a balanced antiship missile defense capability. Specifically, a review of the self-defense requirements for the PHM may be warranted, since the hydrofoil is not currently scheduled to have ECM, long-range chaff, or self-defense weapons other than the 76 mm gun.
- Present efforts to scale these capabilities for larger combatants should continue.

SECRET

APPENDIX A

ISRAELI LESSONS LEARNED FROM THE GROUND WAR

SECRET

Appendix A

ISRAELI LESSONS LEARNED FROM THE GROUND WAR

(U) The summary of Israeli lessons learned from the October 1973 War presented below is based on conversations with numerous IDF officers by the WSEG Data Acquisition Team. It is not a summary taken from an official Israeli document.

A. (S) WEAPONS EFFECTS AND SYSTEMS PERFORMANCE

- (1) The IDF will continue to rely on the tank as the principal weapon system around which their ground forces and tactics will be built. There is no feeling in Israel that fundamental structural changes are required as a result of their heavy tank losses to Arab antitank weapons.
- (2) Self-propelled artillery will continue to be used, with tactical emphasis placed on counterbattery and ATGM suppressive fires.
- (3) Prior to the war, infantry consisted of two independent types—parachute and dismounted infantry (trained and controlled by the Chief of Infantry) and mechanized infantry (trained and controlled by the Chief of Armor). All infantry will now be trained to fight dismounted and mounted as a component of the combined arms force. The current M-113 will be the basic infantry vehicle.

B. (S) SPECIFIC SYSTEMS IMPROVEMENTS DESIRED

- (1) Tank: Greater concentration on survivability (with emphasis on crew survivability), target acquisition means, and maximum load of main gun ammunition.
- (2) Artillery: Extended range capability of the 155 mm howitzer and 175 mm gun; greater survivability.
- (3) Infantry: A mechanized infantry combat vehicle rather than a carrier.

C. TACTICS AND DOCTRINE

(S) While the IDF will continue to rely on the armor heavy formation both to defend its borders and for use in offensive actions as required, the experience of the

SECRET

SECRET

October 1973 War suggests that the force should be better balanced in order to employ the combined force concept, taking maximum advantage of the density and employment of antitank systems and artillery—the latter in response to a lesser dependence on close air support, particularly in the early stages of a conflict.

(S) Tactical employment of ground forces will emphasize the maximum utilization of available terrain, combined with maneuver supported by direct and indirect supporting and suppressive fires.

D. TRAINING

(S) The Israelis analyze their training lessons learned as follows:

- (1) There were some situations for which no doctrine or tactics can be generated—the imponderables. These are by definition extraordinary, they are to be expected in any conflict, and training cannot provide for them.
- (2) Situations were also encountered that were the result of a lack of discipline or nonimplementation of doctrine or tactics. Such situations can only be corrected through intensified training, instillation of discipline, and improved leadership. Changes in tactics and doctrine, and hence training in new areas, are not indicated.
- (3) Lastly, there were situations in which accepted doctrine and tactics were found unsuitable. These situations require significant changes in the training program. Areas requiring improvement are:
 - (a) Combat reporting by units in combat.
 - (b) Transmittal of intelligence data by major command staffs.
 - (c) Operations under artillery fire.
 - (d) Reorganization of forces while still in combat.
 - (e) Establishment of specialized, dedicated forces for night operations.
 - (f) Operations against enemy commando groups in the rear.
 - (g) CBR defense.
 - (h) Casualty reporting and evacuation.
 - (i) Artillery planning and coordination.
 - (j) Application of suppressive fire against ATGMs.
 - (k) Integration of artillery and CAS into the scheme of battle.
 - (l) Planning and execution of air defense.
 - (m) Logistical support operations at night.
 - (n) Logistical supply of artillery and tank ammunition.

A-2

SECRET

SECRET

- (o) Individual marksmanship.
- (p) Utilization of entrenchment, dispersal, and camouflage.
- (q) First aid training.

(S) The IDF proposes to emphasize field exercises related to all aspects of disposition, tactical doctrine, and characteristics of combat, introducing as much realism into such exercises as possible.

E. (S) LOGISTICS

- (1) Forward storage of supplies and equipment must be dispersed and hardened.
- (2) Stored vehicles intended for issue to reserve units should have the combat load of ammunition onboard. The primary bottleneck in movement of reserves from the depot to the front was the combat loading of ammunition.
- (3) There must be less dependence on civilian mobilization for truck transport and engineering equipment.
- (4) Armored vehicles are required for evacuation of wounded and for resupply of vehicles on line during periods of active combat.
- (5) Projected daily expenditure rates for all classes of supply must be reexamined. During the war, projected levels were consistently exceeded due to the intensity of combat.

SECRET

SECRET

A-4

SECRET

APPENDIX B

BIBLIOGRAPHY

UNCLASSIFIED**Appendix B****BIBLIOGRAPHY**

CACDA Report: Analysis of Combat Data—1973 Mideast War, U.S. Army Combined Arms Center, ACN 22216, Volumes I through VIII, June-July 1974, SECRET NOFORN. This is an analysis of material, doctrine, tactics, techniques, procedures, personnel, training, and countermeasures used in the October 1973 War. Volume IV considers air defense, close air support, and helicopter operations. It covers the air battle as it related to these areas and considers its impact on ground operations.

Casey Report: Final Trip Report, U.S. Military Equipment Validation Team (USMEVTI), Joint Chiefs of Staff, JCS 2369/49-2, 20 November 1973, TOP SECRET/SENSITIVE. The USMEVTI went to Israel during the war to validate Israeli losses of equipment and supplies and to assess Israeli capabilities to repair and replace damaged and destroyed equipment.

Close Air Support to the Ground Forces, Israeli Ministry of Defense, 28 July 1974, SECRET. This report, forwarded by LTC H. Schweky, Assistant Deputy of Defense R&D, Israel Defense Forces (IDF), is an analysis of Israeli close air support during the October 1973 War. It denotes deficiencies in concept and techniques and presents recommended improvements.

Cockpit Intelligence #6, USAFERP 200-1, September/October 1973, CONFIDENTIAL. This report contains a debriefing of a Soviet pilot defector. Emphasis is on pilot training and operational flying within the Soviet Union.

Comfy Coat Report: EW in the Middle East, Air Force Special Communications Center, EB 8-74, June 1974, SECRET NOFORN. This is an analysis of the electronic warfare aspects of the October 1973 War.

Lessons Learned Report: A Summary of Lessons Learned in the Arab-Israeli War of October 1973, August 1974, SECRET NOFORN.

25X1
25X1

Report: Joint Operational Intelligence Team Final Report, undated, SECRET NOFORN. This report examines Israeli combat intelligence support to IDF operations, and Arab battle tactics used during the war.

25X1
25X1

Doomsday Report: Air Force Operations in Doomsday War, 6-24 October 1973, Primary Report, HQ Israeli Air Force, November 1973, SECRET. This is an Israeli Air Force (IAF) accounting of its daily activities during the October 1973 War in terms of target strikes, sorties, aircraft losses, and ordnance expenditures.

Hennessey Report: DoD Military Team Visit to Egypt, 14-23 July 1974, Trip Report, Joint Chiefs of Staff, JCS 1887-813, 31 July 1974 (Rev. 14 August 1974), CONFIDENTIAL

UNCLASSIFIED

UNCLASSIFIED

NOFORN. This is a report of a five-man U.S. military delegation that was invited to visit the armed forces of the Arab Republic of Egypt by Field Marshall Hafig Ismail Ali, the Egyptian Minister of War.

IAF MATMON Report, MATMON Information File, Hq Israeli Air Force, undated, TOP SECRET NOFORN. This summary of IAF activities during the October 1973 War includes daily aircraft status, daily sorties by front, aircraft losses by cause and type of mission, and ordnance expenditures; similar to Doomsday Report.

IDF MATMON Report, MATMON Information File, Hq Israel Defense Forces, undated, TOP SECRET. This report lists quantities of weapons and ordnance needed by the IDF for postwar recovery and buildup and presents Egyptian and Syrian orders of battle.

Interaction of Arab/Israeli Naval Forces During the Yom Kippur War, Center for Naval Analysis, CRC 263, May 1974, SECRET/FOR U.S. EYES ONLY. This analysis identifies major factors contributing to the success or failure of naval operations during the October 1973 War, with emphasis on the missile boat engagements. An assessment is made of the effectiveness of weapon systems, tactics, and doctrine employed by the opposing forces.

Kosco Report: Ground Activity of and Subjects Relating to the October 1973 Yom Kippur War,

1974, *SECRET NOFORN*. This is an intelligence report on the conduct of the October 1973 War written by

open sources, office files, U.S. publications, and interviews and briefings by Israeli officers between 6 October 1973 and 20 March 1974. A second installment covering the period 19-28 March 1974 is also referred to as part of the Kosco Report: *Egyptian and Syrian Armies and Their Activities During the October 1973 Yom Kippur War,*

Lake Report: Trip Report of Anti-Ship Missile Defense Meetings With Israel (MWDDEA-N-71-Is-4101), U.S. Navy NESCS, Ser S-226-ELEX-09F, 31 January 1974, SECRET/U.S. EYES ONLY. This is an analysis of Israeli and Arab naval operations during the October 1973 War.

Leavitt Report: U.S. Military Operational Survey Team After Action Report in a Visit to the Israel Defense Forces, Israel, Joint Chiefs of Staff, JCS 2369/50-1, 17 December 1973, TOP SECRET NOFORN. This report presents the findings of the U.S. Military Operational Survey Team (USMOST), which went to Israel with the purpose of determining lessons learned from the October 1973 War.

Marshall Report: The October War: A Synopsis of the 1973 Sinai-Suez Campaign and a Critique of Weapons and Tactics, Army Materiel Systems Analysis Agency, AMSAA SP-11, January 1974, SECRET NOFORN. This is one of the earliest reports on the war that critique weapons and tactics employed.

Tactical Aircraft Net Technical Assessment, Volume I, "Summary," Director, Defense Research and Engineering, 023-3S-7800, May 1973, SECRET. This is an evaluation of various U.S. and Soviet tactical aircraft, with emphasis on their technical capabilities for air-to-air combat.

Talbott Report: Visit of LTG Orwin C. Talbott, Deputy Commanding General, USA Training and Doctrine Command, to Israel, 31 January-12 February 1974, DOA, TRADOC, ATCS-40046, 27 February 1974, SECRET NOFORN (Except Israel). This report covers

UNCLASSIFIED

25X1

25X1

25X1

25X1

UNCLASSIFIED

information provided to LTG Talbott and members of his party during his official visits with senior Israeli Headquarters officers, field commanders, and staff officers.

USMOST Report: After Action Report on a Visit to Jordanian Armed Forces (JAF), Ammon, Jordan, Joint Chiefs of Staff, J-3, JCS 2461/018,01, 22 May 1974, SECRET NOFORN. This report, by the U.S. Military Operational Survey Team, is based on discussions with Jordanian military personnel during the period 2-11 May 1974 who saw combat service in Syria in the October 1973 War. Some of the information substantiates information from other sources, while some is contradictory and questionable.

WSEG Report 225: Preliminary Assessment of the Effectiveness of Weapon Systems Used by Opposing Forces in the October 1973 Middle East War, Weapons Systems Evaluation Group, February 1974, TOP SECRET NOFORN/U.S. EYES ONLY.

WSEG Report 236: Evaluation of Guided Bomb Systems Employed in Southeast Asia, Weapons Systems Evaluation Group, May 1974, SECRET.

WSEG Report 237: Data From the October 1973 Middle East War, Volume I, "Index;" Volume II, "Overview;" Volume III, "IDF Ground Forces;" Volume IV, "Air Operations;" Volume V, "Naval Operations;" Volume VI, "Structures;" Volume VII, "Combat Vehicle Assessment Report," Weapons Systems Evaluation Group, October/November 1974, SECRET NOFORN (Except Israel). This is an analyst's source document on the October 1973 War. The various volumes are being published separately.

UNCLASSIFIED

UNCLASSIFIED

B-4

UNCLASSIFIED

TOP SECRET
NO FOREIGN DISSEM

TOP SECRET
NO FOREIGN DISSEM