Secret

FOR PERSONAL ATTENTION OF:

AO/OCI/IC

Very Interesting Report

Intelligence Report

The 1973 Arab-Israeli War: Overview and Analysis of the Conflict

Secret
SR IR 75-16
September 1975

Copy No. 56

Approved for Release: 2012/09/04

The 1973 Arab-Israeli War: Overview and Analysis of the Conflict

This study examines the military operations of Egypt, Syria, and Israel during the 1973 Middle East war with a view to providing some indications of future force developments in the area. Key findings:

Strategy. The Arabs had different goals and, consequently, different strategies. The Syrians wanted to liberate the Golan Heights and attempted to do so in one stroke. The Egyptians' main goal was to achieve a political effect, and they therefore planned for a limited offensive.

The Israelis, because of overconfidence and because they failed to recognize that their occupation of the Suez Canal's east bank deprived them of advance warning of an Egyptian attack, did not react to mounting evidence of Arab intentions.

Performance of Troops. The Arabs were tough on defense but ill trained and poorly led on offense.

The Israelis showed a depth of training and flexibility that enabled small units to withstand the initial shock of the Arab attack without breaking, and to recover quickly.

Antitank Weaponry. The most effective tank killer in this war was the tank—90 percent of the Arab tanks and at least 75 percent of the Israeli tanks destroyed during the war were hit by enemy tanks.

Antitank missiles such as the Sagger, RPG-7, LAW, and TOW could be countered by appropriate tactics, although they represented a new and dangerous presence on the battlefield.

Air Defense. The Arab air defenses prevented the Israeli Air Force from damaging Arab ground forces on anything like the scale seen in 1967. They achieved their primary aim by disrupting Israeli attacks rather than by shooting down or damaging Israeli aircraft. Israeli loss rates were actually lower than they were in 1967, when the Arabs had only rudimentary air defense systems.

The Syrians destroyed or damaged Israeli aircraft at a rate two to three times greater than the Egyptians because the tactical situation on the Golan front forced the Israelis to accept greater risks.

Mobilization. The Israeli mobilization was untidy and revealed many flaws and shortages. The situation was saved by the training of the troops and by standardized procedures that allowed crews to be scrambled without degrading performance. Despite the problems, the Israelis delivered more combat power to the front line in less time than the plans called for.

Naval Operations. Israel's talent for tailoring its strengths to Arab weaknesses was especially evident in naval operations during the 1973 conflict. The Israeli navy's excellent performance was a sharp contrast to the prewar complacency and overconfidence displayed by the ground and air forces.

CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
September 1975

INTELLIGENCE REPORT

The 1973 Arab-Israeli War: Overview and Analysis of the Conflict

Introduction

This study examines the military operations of the major combatants--Egypt, Syria, and Israel--during the October 1973 Middle East war. It is intended to uncover indications of future force developments and military performance in the area. Another purpose is to provide a basis for considering the applicability of the October war experiences to forces elsewhere in the world.

The arrangement of chapters or sections is designed to accommodate readers interested in only certain aspects of the war. The commentary has been grouped into four major sections: The Air War, The Syrian Front, The Egyptian Front, and Combat Highlights. Within each of these, the account has been further divided into subsections intended to enable each reader to find the topic of special interest to him. Readers of the whole report will find it repetitive to some degree because of the effort to analyze a particular event or situation in terms of more than one aspect of the war. All readers are urged to begin with the Comment on Sources (page 7) and the Background and Summary of the War (page 10).

Comments and queries regarding this report are welcome. They may be directed to [redacted] *Strategic Evaluation Center, Office of Strategic Research,* [redacted]

~~SECRET~~

Contents

~~SECRET~~

Tables

~~SECRET~~

Comment on Sources*

The October war was complex and the information available to analyze it is flawed and incomplete.

These sources often provide unique information of great value, but are limited in quantity and scope.

* See also Bibliographical Note beginning on page 116.

~~SECRET~~

Enough has been verified about tank losses on both sides to establish the magnitude of the losses and their relative number--the number of Arab hulks counted is twice the Israeli number.

Current news accounts can also be unreliable because of deliberate falsification or propagandistic intent, and because what was true for one newsman at a given instant and place is seldom true for an entire action or campaign. *London Times* correspondents claimed, for example, to see pinpoint air support given by the Israeli Air Force on the Golan front, whereas information indicates that the IAF was almost invisible to the Israeli ground forces there because it tried to avoid confronting the Syrian air defense system. These facts are not mutually exclusive, but do illustrate how perceptions have varied.

Approved for Release: 2012/09/04

Background and Summary of the War

The essentially unending Arab-Israeli conflict since 1948 has been marked by major flareups in 1956, 1967, and 1973. The 1956 war forced Egypt to deny use of its territory to Palestinian resistance groups. Galling though it was, the 1956 defeat of the Arabs did not leave the sting that the 1967 engagement and the almost total collapse of their forces did. From that point on, the Egyptians and Syrians were preparing constantly for a war to recoup lost territories and self-esteem.

Prelude to Another War

The time between the 1967 and 1973 wars falls into fairly distinct periods. Through early 1969, Egypt and Syria concentrated on rebuilding their armed forces and retraining their troops. Egypt also pursued diplomatic means of regaining its lost territories. Syria did not, choosing to encourage Arab guerrilla movements--as long as the guerrillas did not attack Israel from Syria often enough to provoke too great an Israeli reaction.

In mid-1969, Egypt initiated the War of Attrition along the Suez Canal, designed to force the Israelis to reach an accommodation. Israel, however, responded by raising its retaliation to a level unacceptable to Egypt. As the fighting mounted in cost and intensity in early 1970, the Soviets were drawn into providing not only vastly increased arms and air defense equipment, but also some 30 Soviet-manned SA-3 battalions and five squadrons of MIG-21 fighters with Soviet pilots. Only vigorous diplomatic action by the US brought about the August 1970 cease-fire which stabilized the lines in the Sinai, but which Egypt used to install the beginnings of its canal-side air defense system.

The situation was manifestly unacceptable to Egypt and other Arab states, but the Arabs had no military leverage to alter matters. Hence the period

from late 1970 through mid-1973 was characterized by Arab diplomatic and Palestinian guerrilla activity designed to put Israel under as much pressure as possible. The most stark illustrations of this activity were the killings in August 1972 at the Olympic Games in Munich, and the July 1973 Security Council debate on the Middle East, which increased Israel's isolation on the international scene.

By early 1973 the level of Arab frustration and the preparations for war had reached a peak that seemed to presage war by April or May. Egypt's apparent hope that something would emerge from the Security Council debate and the US-USSR summit in June seemed to stave off the outbreak. It was during the summer of 1973 that the "oil weapon" seems to have been brought up in Arab councils as a real possibility. The oil-producing Arab states apparently were to be given a chance to show how much influence they could wield with their oil.

Throughout the period between the wars, preparations for the next one continued. The Arabs never thought of diplomatic and military activity as mutually exclusive, but rather as complementary aspects of a policy designed, at a minimum, to regain lost territory. Probably no single incident crystallized the Arabs' decision to go to war. Rather, the combination of increasing confidence in their military capability and frustration over the failure of diplomatic efforts to regain lost territory seems to have tipped the scales in favor of war.

Opening Arab Assaults

Shortly before 1400 Israeli time on 6 October 1973, Syrian and Egyptian armed forces simultaneously launched artillery and air strikes across the cease-fire lines. On the Syrian front these attacks were accompanied by tank and infantry thrusts between the Israeli strongpoints into the Israeli-occupied Golan Heights. Because there were so few men on duty at the time, Israeli defenses in some areas were over-

whelmed quickly, and Israeli forces withdrew to hill-top strongpoints from which they harassed the Syrian columns.

The Syrians pressed their attacks along two axes. The first was directed north of Al Qunaytirah toward the Jordan River. The second attacked south of Al Qunaytirah and split into two main groups, one of which headed north along the Trans-Arabian Pipeline (TAPLINE). The other column struck south down the road leading around Lake Kinneret (Tiberias). *(See foldout map 1b, appended.)*

While dramatic, these were not viable military operations largely because all these armor columns had insufficient infantry support and poor command and control. They were effectively blocked within 24 hours and defeated in less than 72. Syria's farthest known penetration was in the central sector to about 25 kilometers (15 miles). Only one of the Israeli strongpoints along the 1967 cease-fire line fell, and the Israeli armor forces in the area, though small and badly damaged, did not yield. At daybreak on 7 October, the Israelis hit the Syrian columns with air strikes and freshly mobilized armor units. By midday the Syrians apparently had been stopped and by nightfall had been pushed back in many places. Early on the 8th, the Syrians had been pushed back to the 1967 cease-fire lines in some areas south of Al Qunaytirah. By early on the 10th the Israelis had restored virtually all the prewar border.

On the Sinai front, the Egyptian crossing of the canal was deliberately, almost calmly, executed in contrast to the Syrians' headlong rush to take ground. Preparations had been made years before to organize and shelter crossing forces on the west side of the canal; roads and bridges had been built to facilitate the movement of assault forces from assembly areas to the canal [redacted] Egyptian Chief of Staff Sa'ad al-Din Shazli has described the operation in great detail, and his account is in accord with the facts as we know them. The following description is drawn largely from his account.

It was crucial for the Egyptians to move a large number of troops across the canal quickly and to give those troops protection against Israeli armor and air forces. The initial crossing was made in hundreds of small boats by troops heavily supplied with antitank weapons ranging from the shoulder-fired RPG-7 to sophisticated Sagger wire-guided missiles carried by two-man teams or mounted on a few BRDM-2 light armored vehicles. Egyptian troops were also given many SA-7 (Strela) small antiaircraft missiles which could be fired by individual soldiers. Large amounts of artillery were emplaced on the west side to give fire support to the crossing force until bridges could be built to get tanks and artillery onto the Israeli-occupied side.

Long before the war, the Egyptians had built a series of earth mounds overlooking the Israeli side of the canal. They were thought to be no more than observation posts. On the outbreak of war, however, these mounds sprouted tanks and antitank units, the latter armed with Sagger missiles carried by men or BRDM vehicles. By this means the Egyptians added still more antitank and covering fire to their crossing force. At the same time, Egyptian artillery spotters on the mounds could look over the 40- to 50-foot sand wall the Israelis had built and call in artillery fire on Israeli installations and reinforcements as much as five kilometers from the canal *(see drawing on page 17)*.

The Egyptians had also built one of the densest and most diversified air defense systems ever erected to provide protection against the Israeli Air Force. This system consisted of dozens of SA-2, SA-3, SA-6, and SA-7 SAM units, radar-guided antiaircraft artillery, and conventional AAA and heavy machine guns.

The first phase of the Egyptians' three-phase operations plan on the west bank of the canal was essentially completed by the end of 6 October. *(See foldout map 1a.)* Three firm bridgeheads had been established, but by nightfall Egyptian troops had penetrated their planned eight to ten kilometers

Approved for Release: 2012/09/04

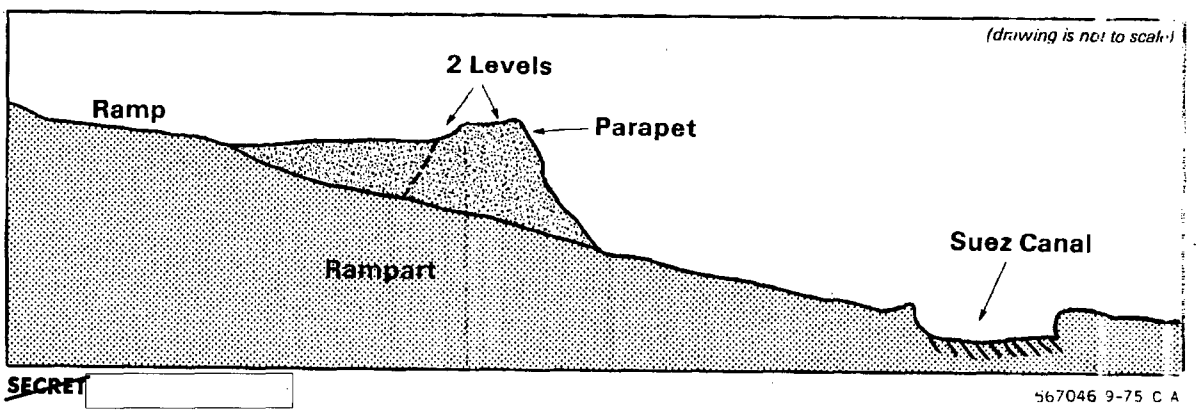
Approved for Release: 2012/09/04

across the canal in only a few areas. To accelerate preparations against a counterattack, they used heavy ferries before bridges were complete to bring in tanks and still more antitank missile units. By early evening several bridges were operating, and Egyptian armor and troops were crossing in strength.

Within the first hours, the Israelis made two costly mistakes. Their experience in the 1967 war led them to believe they could use tanks alone to fight infantry. They did not take adequate account of the effect of antitank missiles in the hands of now better trained, more highly motivated Egyptian troops. The Israelis compounded this error by sending unaccompanied tanks to rescue the isolated garrisons of their canal-side defensive barrier called the Bar Lev Line. When the Israeli tanks attacked alone on 6 and 7 October, they were badly mauled. The low point came on the 8th when an Israeli armored battalion charged into an Egyptian ambush. The unit's tanks were nearly all destroyed or damaged, and the commander was captured.

On 6 October Israel had 293 tanks in the whole of Sinai. Approximately half were out of commission within 36 hours. By the 9th the Israelis had pumped a total of about 700 tanks into the Sinai, but only 300 were operable. Many of the others were not destroyed but may have been down for essential maintenance or repair of battle damage, but it is obvious that the Israeli armor corps was badly dented in the first three days of the war.

The Israelis realized quickly that events had made their tactics obsolete, and they adopted new ones designed to overcome the Sagger antitank missile. One tactic was to designate one tank in each formation to watch for the launch of these missiles and to warn the others. Often this would give them time to take cover. The Israelis also found that, if they fired at the point of launch, they could distract the missile controller and cause the missile to go astray, because the Sagger is wire guided and has to be controlled until it hits its target. Another technique was to fire at places likely to conceal



missile launchers, but this wasted ammunition. In the end, the Israelis rediscovered that the best all-around results came from using a coordinated tank-infantry team: the infantry defended the tanks against missile-carrying enemy infantrymen, while the tanks defended the Israeli infantrymen against enemy tanks and provided fire support.

Israeli Counterattack

First Syria... The Israelis decided--they had little real choice--to stabilize the Sinai front while seeking first to knock Syria out of the war. Having forced the Syrians back to the 1967 cease-fire lines by 10 October, the Israelis began a concentrated attack along the road from Al Qunaytirah to Damascus. They halted their hard-fought advance on high ground near Sa'sa' about 30 kilometers south of Damascus, only when Syrian resistance and counterattacks made it clear that to go farther would cost more than Israel was prepared to pay. *(See foldout map 2.)* It was during this drive that the Israelis met Iraqi and Jordanian counterattacks at Al Harrah that blunted their advance in this area. Israeli action on the Syrian front from 13 October through the cease-fire on 24 October was confined to repulsing Arab counterattacks.

...Then Sinai... While the Syrian front was spotlighted, fighting in the Sinai went into what the Egyptian commander called an "operational pause" designed to accomplish two things. First, the Egyptians anticipated needing several days after crossing the canal to consolidate their position on the east bank and prepare for the next stage of their offensive. Second, because the Egyptians anticipated sizable counterattacks, they planned to wear down the Israeli armored forces as much as possible. In effect the pause was to be a short war of attrition aimed at making the breakout from the canal easier when the time came.

After a few days, however, it became evident that the Israelis were not going to cooperate. They stopped sending their tanks against the Egyptian positions

in blind charges and began to adopt tactics that reduced the effectiveness of Egyptian antitank missiles. According to some reports, the final phase of the Egyptian plan was to go into effect on 14 October and would consist of a drive through the Sinai passes to a north-south line running through Bi'r Jifjafah. *(See map 1a.)* The drive was to be spearheaded by the 4th and 21st Armored Divisions--which, in fact, only began to cross the canal in strength on 12 and 13 October. When the Egyptian breakout attempt came on 14 October, however, it does not appear to have been a well-planned or determined attempt. It lasted one day and reportedly cost the Egyptians 200 tanks.

Because the battle of 14 October lacked the planning and enthusiasm of the canal crossing itself, there is some speculation that it was designed to divert Israeli resources from the Syrian front.* If that was the case, the Egyptian tactic was too late because the Israelis had already accomplished their purpose in Syria and had begun diverting troops and equipment to the Sinai in preparation for the Israeli canal crossing scheduled for the night of 15 October.

The performance of the Egyptians in the few days before 14 October and on that day itself was so lackluster that they appeared to be waiting for the suitable moment to call for a cease-fire--something they could hardly do while the Syrians were being soundly beaten. The Egyptians first publicly mentioned the possiblity of a cease-fire on 15 October. Their condition, however, was a return to the lines of prewar 1967. Since the Israelis were at that very moment preparing to turn the tables on the Egyptians, Tel Aviv failed to acknowledge the offer. The fact that the offer was made just then, however, may indicate that an ending of the war with the gains up to 14 October in hand is what the Egyptians had in mind from the start.

* There is considerable ambiguity surrounding the intentions of the Egyptians in crossing the canal. While their plan seems ambitious, it appears they were willing to settle for relatively modest territorial gains. Their real victory lay in crossing the canal and holding onto some ground. This they did well enough to alter the Middle East equation.

...Then Africa. Between sunset on 15 October and sunrise on the 16th Israeli forces successfully crossed the canal into Egypt proper--"Africa" in the Israeli vernacular. The Israelis had been debating the timing of the crossing for some time. General Sharon, commander of the crossing force, has said he argued for a crossing much earlier in the war. He was overruled in favor of the scheme adopted--to take the Arabs in turn, holding the Egyptians in Sinai while defeating the Syrians on the Golan Heights.

The crossing was aided, according to Sharon, by preparations he had made in the years when he was commander of the Israeli forces deployed in the Sinai. He had marked a deliberately weakened section of the Israeli defensive wall along the canal so that it could be knocked down quickly to make way for a crossing. He had also prepared a protected area some distance from the wall where the Israelis could assemble and organize the crossing force. The Israeli operation when it got under way ran into many unanticipated delays. The roads leading to the crossing site were narrow, unpaved tracks. They were unmarked and difficult to follow at night. Moreover, the Israelis were trying to move elements of two divisions over these roads, causing traffic jams and confusion. Finally, the bridging equipment the Israelis were to use was too large for the roads. Some of it had to be preceded by bulldozers to widen the road and clear obstructions. These noncombat factors delayed the Israeli crossing force and slowed the development of the Israeli operation in Africa.

On the night of the crossing, Sharon launched his 143rd Armored Division at the point where the canal enters the Great Bitter Lake. *(See map 3)*. He counted on the lake to protect his left flank while marshes and half of his division protected his right. One tank brigade drove to the canal and turned north to clear the crossing site and push the Egyptians back from it. The battalion of this brigade nearest the canal was ordered to capture an Egyptian bridge if possible, but the developing fight prevented this. An airborne infantry brigade followed to occupy the crossing site and establish the first bridgehead on the west side. At the same time another tank brigade was attacking due west into the Egyptian 21st Armored and 16th

Mechanized Divisions on the east side in order to pin them down as much as possible, and to tempt the Egyptians into deploying other forces on the east bank away from the canal. Finally, a tank brigade followed the paratroopers, sending one battalion of tanks across the canal on rafts early on 16 October. For several days the remainder of this brigade was tied up in beating back Egyptian attempts to close off the Israeli corridor to the canal.

The Egyptians, victims of poor intelligence and communications, did not grasp the impact of the Israeli crossing but did not need to understand all the details to know that Sharon's was an operation they had to stop. In addition to armored thrusts from north and south, the Egyptians launched a number of commando raids on the Israeli salient. They also called down intense, virtually continuous artillery fire and--despite Israeli AAA and fighter cover--many air strikes, which killed at least 35 Israeli engineer troops and wounded 150 more at the crossing site alone. While never able to sever the Israeli connection, the Egyptians were able for a day or two to interrupt nighttime traffic to the crossing site. After daybreak the Israelis were able to clear the road and get traffic flowing again. Within two or three days, the Israelis had secured their crossing site against ground attack, although the Egyptians kept some pressure on them throughout the war. Artillery and air strikes were continuous problems.

During this time the few square kilometers of the east bank north and east of the Israeli crossing site were the scene of some of the largest and fiercest tank battles on record--centered on the misnamed "Chinese Farm," a pre-1967 Egyptian experimental agricultural project using Japanese irrigation equipment. So severe was the fighting and so great the losses, the Israelis were still clearing the wreckage three weeks after the cease-fire. South of the crossing site, Egypt's 25th Armored Brigade was ambushed before it could reach the area and was virtually destroyed.

The intensity of these battles was a result of several factors. The target area--the crossing site--was small, there was no cover or concealment in the surrounding terrain, both sides appreciated the im-

portance of the engagement, and both had plenty of tanks to throw into it. In the confused melee that characterized the fighting, two factors took on critical importance--the competence of small-unit commanders and the quality of the gunnery. There was little room for maneuver, and combatants were too closely intermingled to give the air force of either side room to intervene. This was the kind of combat in which the Israelis held the advantage.

The Egyptian resistance to the crossing on the east bank of the canal was matched on a much smaller scale by individual and isolated units on the western (Egyptian) side. The Egyptians had transported the bulk of their combat forces to the east bank. On 15 October there were five infantry, two mechanized, and two armored divisions there, plus two independent armored brigades--a force, at full strength, of 80,000 to well over 100,000 men. This left only five widely spaced mechanized infantry brigades and scattered air defense, artillery, and local security troops to defend the west bank. Whether this was the result of a blunder, miscalculation, or gamble is not known. Only one of those brigades was located in the Israeli crossing area. It apparently resisted to the best of its ability but was overwhelmed and destroyed on 16 and 17 October.

The Israeli crossing was conceived as a large-scale operation to defeat the Egyptians. The destruction of SAM and artillery sites was a secondary aim designed to facilitate the achievement of the main goal. But, the crossing force was enlarged slowly and incrementally from not much more than an armored battalion on 16 October to a force of 15,000 to 20,000 men and some 500 tanks by 24 October.

Caution was in order, however. The Israelis had thrown a large portion of their Sinai strength into crossing the canal. If the crossing force were to become bogged down in heavy fighting and unable to disengage, the costs could have been immense. The Egyptian mechanized brigade less than 16 kilometers from the crossing site had to be neutralized before the exploitation of the Israeli crossing could safely proceed.

The southward movement out of the Israeli bridgehead did not get under way until 17 or 18 October and it was carried through by the armored division under General Adan. His force crossed the canal on 17 October after having disengaged in the Al Qantarah area--undetected by the Egyptians--and came south to the crossing site in time to participate in the ambush of the Egyptian 25th Brigade. The full weight of the Israeli drive on Suez did not develop until 21 October when General Magen's armored force joined the move south.

The propaganda from Radio Cairo beclouded the already confused situation. One cannot say whether Cairo's false statements were the result of ignorance or the dictates of propaganda. On the 16th the Egyptians again offered a cease-fire based on a withdrawal to the prewar 1967 lines. Of course, the Israelis were not interested. Egypt deprecated the Israeli crossing, saying that seven tanks had crossed and they were being eliminated. The following day the Egyptians claimed the Israeli crossing force had been defeated and forced to withdraw. In fact, the crossing force had grown to nearly a division. On the 18th, Egypt was still broadcasting the same story about seven tanks having been forced to withdraw while, in reality, a second Israeli armored division had begun to cross into Egypt. The Egyptians' explanation for their confusion is that field commanders minimized the first Israeli crossing force and failed to pass timely information. Command and control were further disrupted when the Egyptian division or brigade commander responsible for the defense of the crossing site died of a heart attack in the early stages of the west bank fight.

On the 19th, the Israelis claimed in public that 10,000 men and some 200 tanks were operating inside Egypt. The Egyptian radio was still saying that the Israeli crossing force had been neutralized and was no threat. The Israelis had by then erected at least two bridges across the canal and installed an air defense system to protect them. Moreover, as the Israeli operation succeeded in disrupting the Egyption rear and destroying SAM units, the Israeli Air

Force had greater freedom to operate. Between 18 and 22 October Israeli air activity reached a peak as the Israeli Air Force took advantage of the exposed Egyptian forces on both sides of the canal.

The Egyptians were faced with a painful dilemma. If they withdrew forces from the east side of the canal to cope with the Israeli incursion, they would give up the territory they had started the war to reclaim. If they did not withdraw forces, they ran the risk of losing all the forces deployed on the east side of the canal. In fact, from 19 October on, the political factor became more and more important. Rumors, later confirmed, circulated that Secretary of State Kissinger was in communication with Soviet leaders on a cease-fire proposal. On the 19th, Premier Kosygin returned from several days of consultations in Cairo. On the 20th, Secretary Kissinger arrived in Moscow.

The Israelis obviously wished to encircle a large part of the Egyptian Army. We do not know if the purpose was to gain a postwar bargaining lever or to accomplish the first stage of a general Egyptian defeat. Even as late as 21 October, however, some senior Israelis reportedly perceived no need to complete the encirclement quickly before rising political pressure from the great powers forced a cease-fire. When the joint US-USSR cease-fire resolution was voted in the UN on 22 October, the Israelis had advanced barely more than halfway to the city of Suez at the south end of the canal. Claiming Egyptian cease-fire violations, the Israelis pressed ahead and cut off the Egyptian 3rd Army and the city of Suez before accepting the cease-fire called for 0700 on 24 October. Violations by both sides continued for several days as the Israelis sought to solidify their hold on the west side of the canal and complete the encirclement of Suez and as Egyptian 3rd Army units made several attempts to break out.

The question of cease-fire violations aside, the fact is that the war ended on a militarily inconclusive note. The Israelis had managed to place the Egyptian forces in the Sinai in a bad position, but

the Egyptians had not yet been defeated. The Egyptian armies maintained their organization and were still well equipped and prepared to defend themselves. There is little doubt they would have fought for some time and that an Israeli effort to destroy the Egyptian Army would have been a costly business. Nevertheless the Israelis had the tactical advantage at that point. On the west bank they had succeeded in opening up the kind of mobile attack at which they excel. The Israelis had destroyed or neutralized most of the Egyptian air defense system on the west side of the canal, thereby freeing their air force to attack the Egyptian armies in earnest. On the Syrian front also, the Israelis had achieved their tactical objectives, but the Syrian Army remained undefeated.

The Air War

Until June 1967 the Israeli Air Force had a reputation as an aggressive, highly competent lightweight among world air forces although better by a wide margin than any combination of Arab air forces. Then, between the hours of 0745 and 1200 local time on 5 June 1967 this lightweight executed an air campaign of unprecedented power and precision in the course of which it destroyed the two largest Arab air forces, those of Egypt and Syria. In the following five days the IAF destroyed Jordan's air force and demonstrated the destructiveness of tactical airpower used against unprotected ground forces. By the end of the war an impression of efficacy and power had been created by the IAF that led both Arabs and Israelis to make mistakes in military planning and judgment that were not exposed until October 1973.

These mistakes are easily summarized. In 1967 the IAF had done so many things so well, the Israeli command concluded that the IAF could simultaneously provide air defense, tactical support to ground troops, support for the navy, and strategic attack, and still make up for shortages of ground-based artillery.

The Arabs were so impressed that they concluded the IAF alone had caused their humiliating defeat in 1967. Hence, they believed, if they could but find the means to neutralize the IAF, Arab ground forces with some expansion and further training could deal with Israeli ground forces on acceptable terms.

Arab Reaction to 1967

In 1967 the Arabs lost a total of about 450 aircraft of all types. Most of them were destroyed on the ground in the first hours of the war. As for other equipment, no count is reliable, but the evidence of damage done and the accounts of those who underwent the attacks indicate that the IAF destroyed a large percentage of the nonarmored vehicles and equipment the Arabs lost during the war. There is

some question about how many armored vehicles the IAF was able to destroy, but the number certainly was not significant in terms of the outcome of the war. The psychological impact of unopposed IAF attacks on Arab ground forces, however, made a considerable contribution to the speed and extent of the Arab collapse.

Arab military activity for the first two years after the war was heavily devoted to replacement of lost equipment, retraining of new troops, construction of passive defense measures against air attack, and the deployment of new air defense weapons. *(See Table 1.)* By mid-1971 the number of SAM battalions deployed in Egypt had more than doubled. Moreover, SA-3s had been received, the first ever to leave Warsaw Pact territory. Major radar facilities had increased in number and many of the preexisting sites had been expanded and improved. The AAA inventory also more than doubled to 2,080 guns. The number of Egyptian MIG-21s on hand at the time more than tripled from 61 in 1967 to 216 in July 1971. Syria followed roughly the same course as Egypt, in that its holdings of MIG-21s had increased from 26 to 100 in the same four-year span. In addition, Syria had just begun to receive SA-2 equipment to make up for the total lack of SAM protection until then.

The state of things in mid-1971 was a drastic change from the situation a year earlier, when Israeli air attacks in retaliation for Nasir's War of Attrition virtually destroyed the Egyptian air defense system.* The system in existence in mid-1971 was created with direct Soviet aid. It was not taken fully under Egyptian control again until late 1972 after Sadat expelled nearly all Soviet military advisers from the country. The period through September

* The 1967 experience as a motivating influence on the Arab defense buildup was reinforced by the Israeli Air Force's success in turning Egypt's War of Attrition (1969-1970) against the Egyptions themselves. The fact that air defenses were being expanded before the War of Attrition indicates, however, that the 1967 war clearly played the central role.

Table 1

Growth of Arab and Israeli Air Defense Inventories, 1967-1973

Type of Weapon	Prewar 1967[a,b]			Mid-1971[c]			Prewar 1973		
	Israel	Syria	Egypt	Israel	Syria	Egypt	Israel	Syria	Egypt
Antiaircraft guns	550	1,100	950	800	1,500	2,080	1,000	1,900	2,750
Air defense radars	11	10	80	[d]	[d]	[d]	20	85	360
SAM launchers									
Hawk	50	--	--	72	--	--	75	--	--
SA-2	--	--	200	--	70	360	--	75	420
SA-3	--	--	--	--	--	200	--	50	220
SA-6	--	--	--	--	--	32	--	60	40
SA-7	--	--	--	--	--	[e]	--	165	600
Aircraft									
MIG-21s	--	26	61	--	100	216	--	186	326
Other Soviet attack planes	--	39	249	--	128	320[f]	--	168	275[f]
Bombers	5	4	68	2	1	52[f]	--	--	26
Mirages	65	--	--	46	--	--	61	--	16[g]
F-4s	--	--	--	78	--	--	99	--	--
A-4s	--	--	--	120	--	--	172	--	--
Other aircraft	144	--	--	91[f]	--	--	22	--	16[f]
Total aircraft	214	69	378	337	229	588	354	354	659

a. Source: [redacted] December 1974, ~~SECRET~~; [redacted]

b. Source: *Arab-Israeli Handbook*, September 1966, ~~SECRET~~; [redacted]

c. Source: *Arab-Israeli Handbook*, July 1971, ~~SECRET~~; [redacted]

d. No figures available.

e. Egypt fired a few early models of the SA-7 (Strela) shoulder-launched missiles at Israeli aircraft in 1970. We do not know how many were available in mid-1971 but it probably was few.

f. Total includes obsolescent aircraft. The Egyptians are phasing out MIG-15s and MIG-17s. The Israelis have phased out Ouragans and older model Mysteres. In 1973 the Egyptians had 16 Iraqi Hawker Hunters on loan.

g. One squadron of Libyan Mirages was in Egypt before the war. The aircraft were flown by Egyptian pilots under Egyptian Air Force command.

1973, nevertheless, saw continued rapid growth of Egypt's air defense system.

While similar increases in facilities and equipment were made in Syria, the deployment pattern remained centered on the cities of Hims, Latakia, and Damascus. In effect, the air defense systems under whose protection the Arabs launched the October 1973 war were built and emplaced in late 1970 and early 1971. The major exceptions were the acquisition by Egypt and Syria of 25 SA-6 battalions in 1972 and 1973 and the movement in the same period of Syrian SAM units from protecting cities to their positions along the Golan cease-fire line.

Through all this the Arabs expanded their ground force holdings and put their ground troops through intense and nearly continuous training. Before the 1967 war the Egyptians and Syrians held about 1,600 tanks between them. By mid-1971 they had about 2,500. And, on the eve of the October war they had almost 3,800. This is a substantial increase but hardly of the same magnitude as the effort expended on air defense. Throughout, the Arabs made no secret of the fact that their equipment acquisitions and training exercises were intended to build a capability to drive the Israelis out of territory occupied in 1967.

The entire pattern of Arab training, equipment acquisitions, and deployments between 1967 and 1973 can be seen as the gradual implementation of a plan to overcome the two major assets of the Israeli armed forces--tactical air and armor. This plan was based on lessons the Arabs learned from the 1967 war, and the main lesson learned was that the IAF had to be stopped. The Arabs recognized problems in their ground forces. That was the reason for increases in equipment inventory and training time. But the magnitude of the increases and effort never matched that put into air defense. Clearly, then, the Arabs believed that they had found the means to neutralize the IAF by 6 October 1973, and it is in this light that the effectiveness of the Arab air defense systems must be judged. The systems succeeded or failed to the extent that they were able to neutralize the effects of the IAF on the Arab forces in the field.

Israeli Reaction to 1967

From the Israeli point of view the 1967 war had gone almost according to plan. It had not been easy--the fighting had been hard and the casualties relatively high. But it had been quick, and the main lesson it imparted to the Israelis was that their armed forces needed little changing. Thus, their activity from 1967 through 1973 was confined to maintaining acceptable equipment ratios with the Arabs, and training to retain the qualitative superiority of Israel's forces over those of its most likely Arab opponents.

While the Arabs increased their passive means of aircraft protection, so did the Israelis--who had always used aircraft shelters and camouflage to a far greater extent because they had so few fields. Radar coverage was improved and extended, taking advantage of the territory occupied in 1967 which gave the Israelis more warning time and provided high ground on which to site their advance surveillance radars. Their inventory of AAA pieces was almost half again as large by mid-1971 in response to increased Arab aircraft holdings, and by October 1973 was almost double the prewar 1967 level. The number of Hawk units and missiles increased from 50 launchers and 174 missiles before the 1967 war to 75 launchers by the time of the October war. This was a substantial, but clearly not a crash, effort. The Israeli ground-based air defense system before 1967 was modest, and it remained so through the October war.

The Israeli thinking was that the IAF could provide the bulk of what air defense might be needed. Between 1968 and 1973 the Israelis poured the bulk of their defense effort and their money into their air force. Over 270 F-4 Phantom and A-4 Skyhawk aircraft were purchased from the US. With this acquisition of a large number of US aircraft capable of ground attack, Israel's Mirage force--61 aircraft in October 1973--was released to concentrate on its primary role of air-to-air combat. But the Israelis took care to give the IAF the capabilities to do the wide variety of jobs assigned to it without unduly

increasing the number of aircraft involved. While the Israeli Air Force increased from 214 to 354 aircraft, the bomb-carrying capacity of the force was raised to four times the earlier level.* This capacity was intended to enable the force to perform close support and strategic attack missions as well as to provide "flying artillery." Nevertheless, the ratio of Egyptian and Syrian fighters to Israeli was permitted to rise from 1.8 : 1 in 1967 to 2.8 : 1 in September 1973.

On the ground, too, the Israelis were content to ride with a winner. The Israeli inventory of tanks increased from 1,250 in 1967 to approximately 1,950 in 1973--a hefty figure but one reflecting no great urgency. In fact, here again Israel allowed, perhaps for unavoidable economic reasons, a critical equipment ratio to worsen: the Arab advantage in tanks climbed from 1.2 : 1 to 2.0 : 1.

Evidently the Israelis believed they had a winning combination in relatively small but very well-trained armored formations and an air force equipped with aircraft to perform a variety of specialized missions--Mirages for air defense, A-4s for ground support and flying artillery, and F-4s for deep penetration, strategic missions, and the flexibility to provide ground support or air defense as well if need be.

Arab Air Defense Systems

The air defense system that covered the Egyptian crossing of the Suez Canal was essentially complete by early 1971. Both the SAM units and many alternate sites for them were so placed as to extend Egyptian SAM coverage 15 nautical miles or more into Israeli-occupied Sinai. When the October war began, the Egyptians had deployed some 30 SA-2, 20 SA-3, and 10 SA-6 firing units in a belt extending the length of the canal and some 30 to 40 nautical miles west

* Aircraft assigned to operational squadrons.

of it in the triangle formed by the cities of Al Qantarah, Cairo, and Suez. This represented a change from the situation that had existed since 1971 only in that the SA-6 units were moved from positions around airfields some 45 nautical miles west of the canal to positions within less than five miles of it. Interspersed among the SAMs were over 2,000 AAA pieces, many of them organic to combat formations in the area and many of them radar controlled. Altogether it was the most diversified air defense system ever constructed with the exception of that built in Syria.

Diversity is an important feature of the air defense systems built in Egypt and Syria. The Arabs had weapons designed to provide overlapping coverage to altitudes over 60,000 feet (SA-2). This meant there was no airspace over the battlefield within which the IAF could operate free of threat. The electronic systems associated with these weapons operated in many different bands of the radio spectrum. This meant that no fighter could carry enough gear for electronic countermeasures (ECM) to defend itself against all threats. Moreover, the Israelis had no ECM gear to cope with some Arab systems such as the SA-6. Thus, despite the fact that the IAF had learned how to cope with some air defense weapons rather well--the SA-2, for example, constituted little threat--the IAF had to recognize that the sheer size and variety of weapons it would face over Arab territory would greatly hinder the accomplishment of its ground support mission and threaten high losses.

Measuring Effectiveness

In this and the following section the Egyptian and Syrian air defense systems are examined from two points of view--first, in the usual way, by counting the number of aircraft they shot down; second, in a much more general way, according to the amount of damage the systems were able to prevent the IAF from inflicting on the Arab ground forces. The first measure concentrates on the attrition factor while the second attempts to reflect the degradation in effectiveness a heavy air defense environment may

cause in an attacking air force. The higher attrition rates the IAF suffered on the Syrian front seem to have resulted more from the differences in the tactical situation on the ground rather than from any difference in capability between the Syrian and Egyptian air defense systems.

The coarsest measure of the effectiveness of an air defense system is the number of aircraft shot down. On the Egyptian front, the IAF lost 51 aircraft during the October war. The Israelis flew about 8,400* sorties against Egyptian targets, meaning that the Egyptians shot down 0.61 IAF aircraft out of each 100 sorties flown *(see Table 2)*--that is, 0.61 percent of the total number of sorties ended with the loss of the aircraft.** This is less than half the loss rate the IAF suffered in the 1967 war, during which the Israelis lost 46 aircraft altogether, the great majority on the Egyptian front. A breakdown of IAF losses by front is not available for the whole 1967 war. On the first day of the 1967 war, however, the Egyptians downed 15 Israeli aircraft. On the first two days of the 1973 war, the Egyptians

* The IAF flew 75 percent of its ground attack sorties against the Egyptians and the remainder against the Syrians. Lacking better information, we assume that the IAF flew its air defense (aerial combat or patrol) sorties in the same proportion. Other assumptions could be made, i.e., Israeli air defense sorties could be distributed in the same proportion as Arab air force sorties--58 percent Egyptian and 42 percent Syrian. The latter assumption was discarded both because the connection between Arab ground attack sorties and Israeli air defense sorties is tenuous at best and because the end result is not greatly different. Given ambiguities in the data, however, the details of the analysis which follows should be taken as illustrative rather than precise. We believe nonetheless that the results accurately reflect the trend and yield useful insights.

** Throughout this paper the loss rate is given as the number of aircraft lost per 100 sorties flown--or, more conventionally stated, in aircraft lost as a percent of the total number of sorties.

Table 2

Israeli Aircraft Losses, by Date, by Battlefront, and by Aircraft Type, 16-24 October 1973, and Loss Rates as a Percentage of Total Sorties

	Days of October																			Totals 6-24 October				
	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st	22nd	23rd	24th	Total aircraft lost	Strike sorties	Air defense sorties[a]	Total sorties	Loss rate (aircraft lost as % of total sorties)
EGYPTIAN FRONT																								
Aircraft lost																								
A-4	3	6	4	8	--	--	--	1	--	--	1	--	4	--	--	--	--	--	--	27	3,178	--	3,178	0.85
F-4	1	1	3	2	--	2	--	--	1	1	--	1	2	--	2	--	--	--	--	16	1,576	811	2,386	0.67
Mirage	--	--	1	--	--	--	--	--	--	--	1	1	--	--	1	1	--	--	--	5	106	2,021	2,126	0.24
Mystere	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	582	125	707	0.42
Total	4	10	8	10	--	2	--	1	1	1	2	2	6	--	3	1	--	--	--	51	5,442	2,957	8,397	0.61
Sorties	334	350	624	589	460	237	343	257	416	400	457	373	411	505	521	495	711	509	405					
Loss rate (%)	1.20	2.86	1.28	1.70	--	0.84	--	0.39	0.24	0.25	0.44	0.54	1.46	--	0.58	0.20	--	--	--					
SYRIAN FRONT																								
Aircraft lost																								
A-4	2	4	1	3	1	6	2	2	--	2	--	2	--	--	--	1	--	--	--	26	1,108	--	1,108	2.35
F-4	--	6	2	1	--	1	2	2	1	--	--	--	--	--	--	1	--	--	--	16	647	272	920	1.74
Mirage	--	1	--	1	2	--	1	1	--	--	--	--	--	--	--	--	--	--	--	6	29	680	710	0.85
Mystere	--	1	--	--	--	1	--	--	--	--	--	1	--	--	--	--	--	--	--	3	46	42	88	3.41
Total	2	12	3	5	3	8	5	5	1	2	--	3	--	--	--	2	--	--	--	51	1,830	994	2,826	1.80
Sorties	71	284	252	217	285	410	255	187	111	114	89	72	50	52	53	112	84	94	34					
Loss rate (%)	2.82	4.23	1.19	2.30	1.05	1.95	1.96	2.67	0.90	1.75	--	4.17	--	--	--	1.79	--	--	--					
BOTH FRONTS																								
Total sorties	405	634	876	806	745	647	598	444	527	514	546	445	461	557	574	607	795	603	439					
Total losses	6	22	11	15	3	10	5	6	2	3	2	5	6	--	3	3	--	--	--					
Loss rate (%)	1.48	3.47	1.26	1.86	0.40	1.55	0.84	1.35	0.37	0.58	0.37	1.12	1.30	--	0.52	0.49	--	--	--					
Cumulative total aircraft lost	6	28	39	54	57	67	72	78	80	83	85	90	96	96	99	102	102	102	102	102	7,272	3,951	11,223	0.91

a. Because Israeli data do not show air defense sorties by front, the breakdown is extrapolated on the basis of other information (see footnote on page 33).

downed 14 Israeli aircraft.* Bear in mind that the Egyptians had nearly three times the AAA and more than six times the SAMs in 1973 and the advantage of prior warning and deployment.

In the first four days of the war--through 9 October--the Egyptians shot down 32 IAF aircraft and the Israelis had flown only 1,897 sorties, a loss of 1.69 percent. The reason the loss rate was so much higher in the first days of the war was that the IAF was preoccupied with trying to cut the Egyptian bridges across the canal. Since the Egyptians anticipated this reaction, they sited heavy air defense protection within range of the bridges. On 10 October the IAF gave up trying to hit the bridges, and its loss rate through the remainder of the war fell to a very low 0.29 percent. In those first days the Israelis made virtually no attempt to suppress the air defense system, concentrating instead on trying to halt the flow of Egyptian men and materiel across the canal. Yet even on the worst day, 7 October, the IAF loss rate was 2.86 percent, considerably below the peak rate of the 1967 war, which was 3.9 percent on the first day. In terms of aircraft shot down, the performance of the Egyptian air defense system in October 1973 was dismal. Despite its enormous increase in size, despite its advance warning, despite its increased sophistication, and despite the fact that the IAF did not attack it in force for the first several days, the Egyptian defenders were barely able to match the performance of their 1967 predecessors.

Another Measure of Effectiveness

On the other hand, aircraft shot down--in either absolute numbers or percentages--may not be the best or most instructive measure of the performance of the Egyptians. The effectiveness of air defense could also be measured by the extent of damage a hostile air force is prevented from inflicting on the force the system is protecting. There is little

* The first two days--6 and 7 October--are used because half the first day had lapsed before fighting started.

direct information, but it seems clear that in preventing damage the 1973 Egyptian air defense system attained considerable success. Evidence includes the continued functioning of the bridges and changes in tactics and weapons that resulted in less accurate and effective Israeli air support.

The heavy volume of AAA and SAM fire must have considerably degraded the accuracy and effect of IAF strikes. [redacted] that the large volume of fire used by the Egyptians when in contact with Israeli ground forces seemed to double whenever an Israeli aircraft came into the area.

Evidence so far available from photography can be misleading. Seldom do photographs obtained in 1973 reveal roadsides choked with burnt vehicles as 1967 photographs did. Such destruction as is evident tends to be spread out and discrete. This is because the Egyptians were neither retreating nor advancing, and the IAF had to hit them where they were deployed --in battle order, spread across the landscape. In scattered places, however, the weight of IAF strikes was plain [redacted] Most of Bur Fu'ad, opposite Port Said, was destroyed. The Israelis made a concentrated effort there apparently to support Fort Budapest, the northernmost strongpoint of the Bar Lev Line and the only one to survive the war intact. This strongpoint was located on a narrow neck of land just a few miles east of Bur Fu'ad. The Egyptian forces attacking it moved through the city and along constricted routes of advance to reach it. It appears that IAF support was important, if not vital, to the defense of this point.

The Israeli bombing of Port Said/Bur Fu'ad was due partly to [redacted] reports of Scud missiles deployed in this vicinity, where they would have been within range of Tel Aviv. In addition, certain point targets, such as SAM sites and the bridges, show considerable evidence of IAF strikes, indicating that the IAF was able to penetrate the air defense zone for particular purposes. Certainly, however, the IAF pilots could not loiter over the battlefield looking for targets of opportunity or spotting them for artillery units as they

Approved for Release: 2012/09/04

did in 1967. This represented a real advantage for Egypt due almost entirely to its ground-based air defense system. As a result, targets inviting IAF strikes--such as military convoys jammed at the approaches to canal-crossing points [redacted] --often went unscathed.

Undoubtedly, the Egyptian ground forces were spared much damage because the Israelis were reluctant to operate over Egypt's main air defense zone. The bulk of the IAF's strike sorties were flown along the battle lines or against targets deeper inside Egypt behind the main defended area. Strikes into the interior of the defended zone were concentrated in a single week, late in the war. In the final few days of the war a large number of air strikes were flown in support of the Israeli drive to encircle Suez and the 3rd Army after many SAM units had been destroyed by Israeli ground forces. The IAF had to contend with the variety of air defense systems deployed throughout the area, but the number of air defense units--hence the degree of risk involved--was considerably higher in the interior of the defended area than it was along the periphery.

The IAF staged major raids inside the defended area only on 14, 15, 17, 18, 19, and 20 October. In the course of these raids the IAF lost seven F-4s, four A-4s, and two Mirages--a quarter of the aircraft lost in the whole war on the Egyptian front. The figures *(see Table 3, page 40)* indicate that Israeli caution was well advised. The F-4 was the primary strike weapon against SAM sites because it could carry both larger ordnance loads and more ECM than the A-4. The A-4s and Mysteres were used primarily for close support. Using their aircraft in this way the Israelis incurred losses much greater than average among their F-4s. In the more permissive environment created by the SAM strikes and the ground attacks on the air defense system, however, the Israelis were able to make greater use of their lower performance attack aircraft. Over 57 percent of the total Mystere sorties flown on the Egyptian front occurred during these six days. In addition the A-4 losses were below average for the war, and much lower than might have been expected.

Approved for Release: 2012/09/04

Table 3

Israeli Aircraft Losses on the Egyptian Front,
14, 15, and 17-20 October 1973

Aircraft	Losses	Strike sorties	Loss rate (%)	Loss rate (%) for whole war on Egyptian front	Expected losses[a]
A-4	4	1,066	0.38	0.85[b]	9
F-4	7	449	1.56	0.67[c]	3
Mirage	2	34	0[d]	0.24[d]	0
Mystere	0	335	0	0.42	at least 1
Total	13	1,884	0.69	0.61	12

a. Applying Egyptian front loss rate for whole war to sorties flown in this period.
b. A-4s flew only strike sorties in the October war.
c. F-4s flew defense and strategic attack as well as strike missions. All F-4s lost on the Egyptian front after 11 October were engaged in strike sorties.
d. Mirage losses occurred only during air defense sorties. These were mostly in the period 14-20 October, reflecting increased Egyptian Air Force reaction late in the war as the air defenses along the canal were worn down.

Some days saw higher losses than others. On 18 October six IAF aircraft were lost out of only 263 strike sorties flown. The next day, however, no aircraft were lost out of 357 strike sorties flown. The contrast is probably due to differences in targets attacked and tactics employed.

The Egyptian air defense system continued to be dangerous throughout the war despite IAF efforts to neutralize it. In the last three days of the war, for example, no Israeli aircraft were lost, but six were damaged *(see Table 4)*. Throughout the war the potential of the system to inflict losses forced the IAF to use tactics and types of ordnance that were less than optimal. The Israelis found that if they stayed above 10,000 feet they could cope with the Egyptian air defense weapons. At that height they were above the effective range of AAA, their ECM and tactics against the SA-2 and SA-3 were effective enough to make the risks of operating at that altitude acceptable, and their pilots had sufficient warning of an SA-6 launch to take evasive action. However, the combination of altitude and evasive maneuvering severely degraded the accuracy of IAF weapons delivery. The effect of the Arab air defense system on ordnance loads shows in the almost total absence from this war of napalm drops and strafing--tactics which require long, low, extremely vulnerable approaches to the target for optimum effectiveness. They would have been extremely effective against Egyptian troops and soft vehicles deployed in the relatively crowded areas of the Egyptian bridgeheads in Sinai, especially in the first 24 to 36 hours.

The survival of the 3rd Army as a fighting force is an indirect indication of the ability of the Egyptian air defense system to protect its ground forces. In the last four days of the war the Israelis lost one aircraft and had six others damaged and the average daily level of strike sorties was higher than almost any other four-day period of the war. These Israeli strikes were concentrated almost exclusively on the 3rd Army area, including that part of it on the east side of the canal. When the war ended that part of the army consisted of some elements of one armored division (the 4th) and the

~~SECRET~~

Table 4

Israeli Aircraft Damaged, by Date, by Battlefront, and by Aircraft Type, 6-24 October 1973, and Damage Rates as a Percentage of Total Sorties

	Days of October																			Totals 6 to 24 October			
	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st	22nd	23rd	24th	Total aircraft damaged	Total sorties	Damage rate(%)[a]	Combined damage and loss rate (%)[a]
EGYPTIAN FRONT																							
Aircraft type																							
A-4	4	8	9	8	1	2	2	1	--	1	6	2	7	3	--	--	4	1	--	59	3,178	1.86	2.71
F-4	1	6	9	3	7	--	--	1	3	6	1	--	2	--	2	--	--	--	1	42	2,386	3.35	4.02
Total	5	14	18	11	8	2	2	2	3	7	7	2	9	3	2	--	4	1	1	101	5,564	2.50	3.27
SYRIAN FRONT																							
A-4	--	10	3	4	3	5	2	3	--	--	1	--	--	--	--	--	--	--	--	31	1,108	2.80	5.14
F-4	--	3	4	1	8	5	4	1	--	1	--	--	--	--	--	--	--	--	--	27	920	5.54	7.28
Total	--	13	7	5	11	10	6	4	--	1	1	--	--	--	--	--	--	--	--	58	2,028	4.04	6.11
FRONT UNKNOWN																							
F-4	6	3	8	9	--	6	6	3	10	2	1	1	--	1	--	2	2	2	--	62[a]			
Cumulative total	11	41	74	99	118	136	150	159	172	182	191	194	203	207	209	211	217	220	221	221	7,592	2.91	4.03
Percent of 6-24 Oct total	5	18.6	33.5	44.8	53.4	61.5	67.9	71.9	77.8	82.4	86.4	87.8	91.9	93.7	94.6	95.5	98.2	99.6	100				

a. In the data for damaged A-4s, the battle front involved is known in all instances. The front is not known in the case of 62 damaged F-4s. These are distributed in the last two columns in proportion to the distribution of damaged F-4s for which the front is known. The figures in these columns represent aircraft damaged and aircraft damaged or lost as percentages of total sorties.

remnants of two infantry divisions, plus an armored brigade.* Though mauled in the fighting, these units retained their organization and ability to fight with some 200 operable tanks and associated combat and support elements. It seems likely that the AAA held by the units in the Sinai and the SAM coverage extended over the area from the west side of the canal combined to help prevent the IAF from inflicting the widespread damage that characterized the 1967 war.

The story was quite different on the west side of the canal over the area occupied by Israeli ground forces. In the final four days the IAF devoted considerable sorties to supporting the Israeli drive to surround Suez, and it often used a tactic in which a small Israeli ground unit would pin down an Egyptian unit with fire and call in an IAF air strike. This minimized Israeli casualties and allowed the bulk of Israeli forces to continue the drive south. The IAF was able to make this tactic work, because the Israeli force on the west bank had knocked out many SAM and other air defense units. In this lighter air defense environment the IAF apparently was able to provide excellent ground support over at least part of the Israeli enclave west of the canal.**

Comparison of Syrian and Egyptian Performance

The Israelis lost the same number of aircraft (51) on each front, but the loss rate on the Syrian front was three times as high as on the Egyptian front, primarily because the situation facing Israeli ground forces on the Golan forced the IAF to take greater risks there. The Egyptians, moreover, had some 130 SAM battalions and some 2,750 AAA guns, whereas the Syrians had only about 37 SAM battalions (11 SA-2, 11 SA-3, and 15 SA-6) and 1,900 AAA guns. This indi-

* By 20 October most of the 4th Armored Division had withdrawn across the canal, where it helped defend the city of Suez when Israeli forces surrounded, but did not occupy, it on 23 and 24 October.

** In this, the Israelis were helped by the weakness of the SAM deployment opposite their crossing point and west of the Great Bitter Lake.

cates that the air defense system on the Syrian front was much more effective than that along the Suez Canal. Of the possible explanations, equipment differences can be ruled out because both Arab states used the same types of SAMs and AAA weapons. Differences in crew training are also unlikely because the Egyptian and Syrian systems both were essentially designed and installed with Soviet advice and Soviet-trained manpower,* and other evidence indicates no significant difference between the two systems in terms of training activity or competence in combat.

Two factors, however, do seem to have been very different on the Golan front and could account for the higher losses. First, the battlefield area defended by the Syrian SAM system was smaller--about 1,800 square nautical miles, as compared with 3,700 sq nm for the Egyptian system. Second, and more important, the tactical situation in the ground campaign was very different. Initially, the Syrians pushed harder and deeper into Israeli-occupied territory than Egypt did, and the Syrian attack was much closer to Israeli population centers. The Israeli command, therefore, decided it had to give priority to defeating the Syrians while the Egyptians were only to be contained until forces could be freed from the Golan front to deal with them. Air power was a major element in this strategy, and the role the IAF had to play forced it to accept greater casualties.

Until the Golan front was stabilized, the IAF concentrated its strikes along the 1967 cease-fire line and SAM units immediately behind it. The overall Israeli aims in the first days of the war were to separate the Syrian tanks from their infantry and logistic support and to interdict and harass lines of communication deeper in Syria. While Syrian armor

* At the time of the war Syria had about 350 Soviet advisers working with its air defense forces. The Egyptians had a total of 200 advisers, most of them probably not involved in air defense. This may have made some contribution to Syrian effectiveness, though we cannot calculate how much.

forced its way past the Israeli positions along the frontier, the bulk of Syrian infantry and other support units could not. According to Israeli accounts, the IAF figured importantly in maintaining the separation of the two. By so doing, the IAF helped the Israeli ground forces in their effort to restore the prewar boundaries quickly and go into the offensive. In fact, the Syrian attack was blunted within 24 hours, and the initiative had passed to the Israelis within 72 hours.

But the IAF paid. Its loss rates on the Syrian front through 13 October were the highest of the war *(see Table 5)*. After 13 October both the number of strike sorties flown and the number of aircraft lost fell precipitously. By the end of 13 October the IAF had lost over 84 percent of the aircraft it was going to lose on this front, had incurred over 96 percent of the aircraft damage it was to experience there, and flown over 84 percent of the strike sorties it was going to fly over Syria.

These figures show that the IAF could not break down the Syrian air defense systems. For all its efforts the IAF could only provide the necessary minimum of support to its ground force without establishing a zone where it was relatively free to operate. In comparison, by the time the IAF had incurred 80 percent of its losses and 81 percent of its aircraft damage on the Egyptian front, it had flown only 54 percent of its strike sorties, indicating a considerably eased air defense environment in the final week of the war.

The significant difference in the situations facing the IAF is shown by the fact that on the Egyptian front one SAM site was struck for every 116 strike sorties flown, while on the Syrian front one SAM site was struck for every 70 sorties flown. In Syria there was much less chance to hit worthwhile targets without exposure to SAM fire. Hence, proportionately more SAM strike missions were flown. In strikes on Egypt the IAF could avoid the SAMs, but the IAF's mission in Syria forced it to operate in high risk areas.

Table 5

Israeli Aircraft Losses on the Syrian Front,
6-13 October 1973

Aircraft	Losses	Strike sorties	Loss rate (%)	Loss rate (%) for whole war on Syrian front	Expected losses[a]
A-4	21	916	2.29	2.35	21
F-4	14	568	2.46	1.74	10
Mirage	6	15	0[b]	0.85[b]	0
Mystere	2	42	4.76	3.41	at least 1
Total	43	1,541	2.79	1.80	28

a. Applying Syrian front loss rate for whole war to sorties flown in this period.
b. No Miraqes were lost during strike sorties.

The Syrian air defense system was more effective than the Egyptian in terms of shooting down Israeli aircraft, so it probably was as effective in preventing IAF damage to Syrian forces. Isolated IAF successes occurred when the IAF was able to show some of its 1967 style. One of its victims was a Syrian artillery convoy caught on the road and almost totally destroyed. This was a rare exception. Though the IAF helped maintain the separation between Syrian infantry and armor units in the first two days of the war, it had no major impact on the subsequent ground fighting on the Golan front. Its major successes against Syria were the raids on infrastructure targets such as oil depots and electrical generating plants. The stubborn survival of the Syrian air defense network mirrors the slow, grudging giving of ground before superior force that characterized the retreat of the Syrian Army before the Israeli drive toward Damascus. Indeed, there probably was considerable interaction between the ground and air defense forces that made the endurance of both possible.

Performance of Israeli Air Defense System

Primary responsibility for Israel's air defense lay with the IAF, which controls all air defense units. The Israelis deployed about 12 Hawk battalions of six launchers each, as well as 900 to 1,000 AAA pieces. The Israeli campaign against the Arab air forces took three forms: ground-based air defense against Arab aircraft intruding into Israeli-controlled airspace, aggressive patrolling to seek air-to-air combat, and air attacks on Arab airfields. The air activity was limited and not successful to any significant extent because of the Arabs' hard shelters for their aircraft. Although the IAF did bomb the runways of a number of airfields, the damage was easily repaired. The IAF did not press a campaign to keep any airfield closed.

We do not have enough information to judge the success of the Israeli Air Force in intercepting Arab aircraft. The IAF claims to have shot down at least 14 Egyptian helicopters as they attempted to

carry commandos into the Sinai interior in the first days of the war. IAF aircraft were also heavily engaged in keeping Egyptian aircraft away from the Israeli canal-crossing site.

The main burden of defense over Israeli-occupied territory fell on Hawk and AAA units. The Israeli data indicate that Hawks shot down 22 Arab aircraft in the course of 32 engagements during the war. This very high success rate was due to the high state of Israeli crew training and maintenance and to the absence of ECM and lack of skillful tactics on the part of the Arab attackers. Israeli AAA crews accounted for 78 Arab aircraft losses *(see Table 6)*. An indication of the intensity of the Egyptian air assault on the Israeli canal crossing site is the claim that 25 Egyptian aircraft were shot down while attacking it--nine by Israeli Major General Sharon's headquarters group.

One cause of the relatively high Arab losses to the Israeli ground-based air defense system apparently was that the Arab air forces flew their missions without taking as many precautions to avoid heavily defended areas as the Israelis did. They also did not seem to vary their tactics as much as the Israelis did to take account of the capabilities of various Israeli weapon systems. While thir losses were high as a result, the Arab air forces were able to inflict significant casualties on the Israelis. At least two Hawk sites and two 175mm gun batteries were damaged by Egyptian air attacks--one of the gun batteries quite heavily. The Egyptians were also able to damage an Israeli tank repair depot, disrupting that vital work. In a survey of 2,900 out of the approximately 8,150 combat casualties suffered by the Israelis during the war, 266 were caused by Arab air action. This included 76 killed.

A peculiarity of the Israeli air defense system is that the IAF controls all antiair units as well as all aircraft. This makes for a very tight and responsive control, but the burden on the IAF command and control structure showed. One minor but illustrative example was an order to an IAF aircraft

Table 6

Arab and Israeli Aircraft Losses by Cause,
6-24 October 1973[a]

Cause of aircraft loss	Israeli losses	Arab losses
Air combat		
Air-to-air weapons	3	261
Other[b]	0	73
	3	334
Ground-based system		
SAM, crew-served	40[c]	22[d]
SAM, man-portable	4[e]	0
AAA	31	78
SAM/AAA	6	0
	81	100
Miscellaneous		
Technical failure	9	0
Other	6	22[f]
Unknown	10	59
	25	81
Total	109	515

a. Includes losses of noncombat aircraft.
b. Such as flying into the ground, premature ejection, or other pilot error.
c. Losses to SA-2, SA-3, or SA-6 missiles.
d. Losses to Hawk missiles.
e. Losses to SA-7.
f. Destroyed on the ground.

to deliver a close support strike when it was loaded to drop propaganda leaflets. A more serious command and control problem is revealed by a survey of 843 Israeli tank commanders and crewmen: a total of 118 men, 14 percent of them, stated they had been attacked by friendly aircraft.

The IAF's greatest advantage relative to the Arab air forces was, and still is, in air-to-air combat. Air-to-air combat destroyed 334 Arab aircraft of all types, [redacted] Most of this combat occurred over Egypt. There is some conflict over IAF losses in aerial combat. One IAF F-4 was lost to Egyptian MIGs and two were lost over Syria. Three Mirages were lost as a result of the subsequent failure of repairs to damage incurred in aerial combat. Assuming the loss of six aircraft, the IAF's air-to-air kill ratio was almost 56 to 1--better than the kill ratio of 48 to 1 that obtained between the 1967 and 1973 wars. The main reasons for the disparity in performance between Arab and Israeli pilots are the exacting training of IAF air and ground crews and their higher levels of technical proficiency. The technical advantage shows in the fact that 176 of the 261 Arab aircraft destroyed by air-to-air weapons were shot down by missiles. This is in marked contrast to the 1967 war, when few air-to-air missiles were used and none was credited with a kill. Of the approximately 440 Arab aircraft destroyed in the 1967 war, only 60 to 70 were lost in aerial combat. Over half of the AAM shoot-downs in 1973 were achieved with an Israeli-built missile. The evidence and Israeli assessments indicate that the performance of the Arab pilots in 1973 showed no improvement over 1967. It is noteworthy, however, that the Arabs showed no reluctance to engage in combat once airborne as they had in 1967.

The Syrian Front

Strategically, the Israelis gave first priority to the Syrian front because Arab gains there would have had an immediate adverse effect on Israel even if the Syrians were prevented from occupying any territory inside Israel's pre-1967 borders. The prospect of Syrian forces regaining the Golan Heights from which they could resume shelling Israeli settlements was intolerable to Israel.

The somber Israeli reaction to what was a clear victory is due to several factors whose full import is still--almost two years later--only slowly becoming clear. Israel's confidence in its warning system was demolished. Despite steps taken to reinforce the Syrian front in the week before the war, Israeli forces there were grossly inadequate considering the threat. The performance of the Syrian soldier came as a shock --though it should not have--driving home the point that Arabs could learn to fight and would do so. More important than these, however, are two nonmilitary factors in the Israeli reaction to the Syrian attack. The first is political. Wars are fought to obtain some political end. Syria's purpose was to recapture the Golan area if possible, but at least to force Israel to reconsider holding Syrian territory indefinitely, and, in this, Syria succeeded despite its relatively poor military performance. Secondly, in the first 24 hours of the war Israel had a glimpse of its mortality. It seemed that the Syrians were going to drive the Israeli Army off the Heights. For the first time in its national existence Israel was confronted with the real possibility that it could lose a war, with all the terrors that this implied and all the memories that were reawakened. No conceivable Israeli victory could have wiped out the memory of those first 24 hours.

The Golan fighting reconfirms the supreme importance of good small-unit leadership, the value of solid command and control, the primacy of quality over quantity, the great difficulty of managing multiservice operations, and the even greater difficulty of mounting multinational operations.

Syrian Deployment

Since the 1967 war the Syrians had deployed the bulk of their army between the cease-fire line and Damascus. The orientation of some small units toward Jordan was a relatively minor distraction, with the exception of the September 1970 invasion of Jordan precipitated by King Husayn's repression of the Palestinian militants. In the years preceding the 1973 war the normal case saw the cease-fire line manned by battalion-size elements of three Syrian infantry divisons--from north to south, the 7th, 9th, and 5th *(see foldout map 1b)*. Two armored divisions--the 1st and 3rd--and three independent armored brigades were deployed over a wide circle around Damascus. While this was the general outline there was a large degree of variation. In times of tension, which were common, the units along the border would be reinforced and routinely larger or smaller units would be rotated through training cycles at training areas in the desert east of Damascus.

As the war drew nearer--from around 10 September on--the Syrian deployment underwent a drastic change as more and more troops were moved to the border positions. Whereas each infantry division might normally have only a battalion or two in the front line positions, by early October each division had two infantry brigades up front with its mechanized and armor brigades close behind. Artillery and air defense forces were also deployed to positions closer to the border. In addition, the 9th and 5th Divisions, south of Al Qunaytirah, were each assigned one of the independent armored brigades to help in their intended breakthrough. The two armored divisions were moved out of their barracks, as was the other independent armored brigade. This brigade, equipped with T-62 tanks, was called the Assad Force.

The Syrian plan was to make two main attacks. The primary effort would be in the south, where the 9th and 5th Divisions would attack simultaneously along a six-kilometer front centered on Ar Rafid. This force would be backed by the 1st Armored Division

and two independent armored brigades. The secondary effort would be made in the north by the 7th Infantry Division backed up by the 3rd Armored Division and the Assad Force brigade. The route of advance for these units in the north would be through a small gap between two hills four or five kilometers north of Al Qunaytirah. Altogether the Syrians assembled approximately 950 tanks, some 600 to 700 major artillery pieces, and about 70,000 men for the initial assaults.

The Israeli Deployment

Against this force the Israelis would normally have had one infantry and one armored brigade--a force of approximately 5,000 men, 100 tanks, and 50 major artillery pieces. These forces, moreover, would have been spread thinly along the border in 15 fortified, hilltop outposts, each with one to three tanks and a company or less of infantry, depending on the local situation. The mobile reserve for this line was provided by the remainder of the armored brigade based at Kafr Naffakh a few kilometers southwest of Al Qunaytirah. Times were obviously not normal in late September so a hasty reinforcement was ordered. The 7th Regular Armored Brigade, based at Beersheba in the Negev Desert, was ordered to the mountains of the Golan. Its personnel were flown north and took possession of Centurion tanks from reserves in northern Israel. The first battalion arrived on the Golan on 3 October. The last battalion arrived two hours before the war started on 6 October.

With the arrival of the 7th Brigade and its 105 tanks, the Israelis had it, the 188th Regular Armored Brigade with 76 operating Centurions, and the Alexandroni Regular Infantry Brigade--a total of 181 tanks, about 7,500 men, and 50 major artillery pieces. The 7th was assigned responsibility for the area north of the road from Al Qunaytirah to the Benot Ya'aqov Bridge, while the 188th took the area lying to the south. The Alexandroni Brigade was scattered along the outpost line and strongpoints over the whole

territory. Because the 7th arrived late, it was clustered close to Kafr Naffakh 13 kilometers or less from the point at which the Syrian 7th Division was due to penetrate. The defensive system adopted by the Israelis on the Golan was, conceptually, similar to the system used along the Suez Canal--a string of lightly manned fortified positions along the cease-fire line, with mobile armor concentrations in reserve.

The Syrian Attack

The Syrian attack got under way a little before 1400 local time. The hour was chosen in a compromise between the Egyptian and Syrian commands. The Egyptians wanted to attack in the late afternoon while they had enough daylight to get a substantial number of men across but with a long night coming soon enough to build their brigades and cross heavy equipment in darkness. The Syrians would have preferred a morning attack with the sun in the Israelis' eyes and a long day in which to make their initial gains and with nightfall before Israeli reserves could begin to arrive in strength. The compromise on 1400 saved the Syrians from having to attack with the sun in their eyes, while giving the Egyptians most of what they wanted.

The attack was preceded and accompanied by a heavy Syrian artillery barrage and around 100 strike sorties by the Syrian Air Force. In both cases the targets were preselected and were bombarded without regard to effect and other activity. Israeli troops soon learned to avoid paved areas and the hard surfaces of roads since the Syrians seemed to have pre-targeted these and could quickly bring fire to bear on them. On unanticipated targets, however, the Syrians had mixed luck. Via an extensive direction-finding and Comint network, the Syrians were able to detect and target Israeli units quickly and well. But the accuracy and effectiveness of the artillery fire which followed were well below par. As a consequence, the Israelis were able to neutralize much of Syria's offensive punch by frequently moving their headquarters and artillery units, and by curbing their own communications.

The initial assault on the ground was carried off by the armored battalions of the infantry brigades. These units had been specially trained to overcome the nearly continuous Israeli border barrier--a sandwich composed of antitank minefields on both sides of an antitank ditch five meters wide by two meters deep. The excavated soil was piled along the Israeli side of the ditch to make a berm more than two meters high. This was intended, of course, to hinder a crossing force, but, ironically, it also provided some protection for the force as it approached the barrier.

The Syrian tactic was to form barrier-crossing units, each consisting of a tank with a mine-clearing roller followed by a bridge-laying tank. These were accompanied by eight or ten tanks and a company or so of infantry in APCs. The roller would clear a path through the minefield to the edge of the ditch, then reverse along its own tracks to allow the bridge layer to come in and bridge the ditch. The layer would then back out and the roller tank would retrace the path, cross the bridge, and clear a path through the minefield on the other side. That was the plan, and it occasionally worked.

Not infrequently, however, the antimine roller would snap off when the tank hit the ground coming off the far side of the bridge. In that case the tank would keep going until it was disabled and other tanks would just follow each other's tracks until a path was eventually cleared. Also, the loose soil of the berm, and the fact that the resulting upward tilt of the assault bridges made for a slow and unstable crossing, often toppled a Syrian tank into the ditch *(see photograph, next page)*. The Syrians were further hindered by a minefield on the Israeli side of the ditch which had been installed only several days before the war. The Syrians' performance, nevertheless, shows the willingness of their tank crews to take chances and make sacrifices.

According to information [redacted] from captured documents, the Syrians planned to make about 30 crossings of the ditch in the opening assault. In fact only about 11 were made. Even this limited success was made possible primarily by continuous artillery fire on Israeli positions and

Syrian Tank Thwarted in Effort to Cross Israeli Barrier Ditch
October 1973

the covering fire of the tanks and infantry of the ditch-crossing task force. Without these the Israelis would have taken a much higher toll of the Syrian tanks from their hilltop positions. During the night, however, the Syrians brought in additional equipment, including bulldozers, to clear and fill crossing sites along the ditch. By morning the Syrians had expanded the number of their crossing sites in a limited number of areas, and at first light on 7 October the Israelis had to contend with large units of Syrian armor operating behind their positions in the southern Golan and heavy pressure all along the line, especially north of Al Qunaytirah.

The Southern Penetration

One of the accepted principles of military tactics is that concentration of superior force at a chosen point is the surest route to success. Of the Arab armies the Syrians were the only ones to use this prin-

ciple even some of the time. Their southern thrust was their most successful one and the one in which they came closest to applying the principle. The 9th Division north and the 5th Division just to the south attacked in concert as planned across the six-kilometer front centered on Ar Rafid. The leading elements of both divisions quickly penetrated Israeli-occupied territory, bypassing the strongpoints in their path. Before nightfall they had reached the road paralleling the 1967 cease-fire line in the area and had substantial numbers of troops behind the Israeli defense line.

Once on this road, however, the divisions dissipated their momentum by spreading out. The 5th drove straight ahead and also turned south along the road, rapidly overrunning several Israeli settlements. By daybreak on 7 October the Syrians in this sector had advanced over 15 kilometers past Ramat Magshimim and some eight to ten kilometers westward toward the heights overlooking Lake Kinneret. The 9th Division turned north along two primary routes: one followed the road toward Al Qunaytirah; the other followed the path of the TAPLINE, which runs northwestward across Israeli-occupied Golan.

This drive penetrated the weakest part of the Israeli line. The main defense in the area was made up of the understrength and scattered tanks of the 188th Armored Brigade. Paradoxically, however, the scattering of its tanks may have saved both the brigade and the Israeli hold on the Golan. If the 188th had been deployed as a compact unit it might have been overrun or shattered by the initial Syrian rush. As it happened, small groups of Israeli tanks maintained their organization and conducted a series of holding actions, each of which by constant resistance sapped the strength of the Syrian forces, which were also scattered by now. The bypassed Israeli strongpoints harassed the Syrian units passing by on the roads beneath them. The Syrians were largely held to the roads by the poor trafficability of the Golan and by Israeli strongpoints on the high ground. The strongpoints proved their worth by delaying the infantry support that armor units need

for staying power. Syrian logistics were also disrupted both by losses to Israeli fire and by delays caused by traffic snarls on the roads, but the Syrians never mounted a concerted effort to eliminate any of the Israeli hilltop positions.

The Israelis, in short, were constantly nibbling at the Syrians. In one case eight tanks of the Israeli 188th hit the flank of the Syrian 43rd Armored Brigade of the 9th Division as it tried to reach Al Qunaytirah. According to Israeli figures, 60 Syrian tanks were destroyed or disabled in this one action. In another, five Israeli tanks met the Syrian thrust up the TAPLINE. Before four of the Israeli tanks were destroyed, some 30 to 40 Syrian tanks were lost. The fifth Israeli tank ran out of ammunition, so it climbed to a hill top, and its commander directed Israeli artillery fire at the Syrians until it got too dark to see.

The Syrian 1st Armored Division moved down from the Damascus area and came into the action in the Ar Rafid area in the course of the first night, where it established a base area in the vicinity of Al Khushniyah. It turned north, reinforcing the drives along the road to Al Qunaytirah and the TAPLINE. The Syrian 51st Armored Brigade made the deepest penetration of the war, moving up the TAPLINE and reaching--about noon on the 7th--Israeli Golan area headquarters at Kafr Naffakh. Several tanks of the 51st actually drove into the headquarters compound, apparently without realizing the importance of the installation they were in. After shooting at whatever seemed most obviously important they moved on. They were almost immediately overwhelmed, however. Other tanks of this unit moved along the road until they looked down on the Benot Ya'aqov Bridge. From this vantage point they picked off eight Israeli tanks trying to climb onto the Heights before they were themselves destroyed by a detachment from the Israeli 7th Brigade.

During the 7th the fighting continued, with the Syrians bringing in reinforcements and maintaining constant pressure on the Israelis. The Israeli 188th Brigade was down from 76 operable tanks at 1400 on 6 October to 13 operable tanks 24 hours later. Within those 24 hours the Syrians had occupied nearly half the Israeli-controlled Golan Heights. There was no way of knowing what the precise status of any units

on the Golan was--either Syrian or Israeli. But the Israeli government and military command did know how thin they had been at the start and the reports they were receiving during the first 12 to 24 hours seemed to tell of continual Syrian advances. Moreover, their outposts reported constant efforts to reinforce. The Israeli Air Force was trying to disrupt Syrian supply lines and advancing units. The IAF's losses, as previously noted, were very high. At that point the effectiveness of the IAF attacks was still unknown. All these factors contributed to a profound pessimism on the part of Defense Minister Moshe Dayan, which was, to some degree, shared by others in the Israeli command and political leadership.

Even though neither side realized it at the time, however, by midmorning of 7 October the situation on the Golan had stabilized and Israeli advantages were beginning to surface. The 188th, although scattered and decimated, continued to oppose the Syrians, exacting a high toll. By its continual opposition the 188th had almost brought the Syrian thrust to a halt, and some Syrian units had begun to dig in. The Israeli reserves were beginning to arrive in strength. During the night the command elements and some small units of two Israeli reserve armored divisions had arrived on the Heights. A unified field command had been established to coordinate the fighting on the scene, and areas of responsibility had been laid out to facilitate the entrance into combat of the reserves when they arrived. The Israeli outpost line remained intact and continued to harass and hurt the Syrian troops trying to pass through to reinforce and resupply Syrian units behind Israeli lines. The Israeli Air Force appears to have succeeded more than anyone knew at the time in interdicting Syrian supply lines.

On 6 October the IAF flew only 71 strike missions over the Golan, but on the 7th it flew 284. The IAF was accused of not supplying close air support in the first days because the Israeli troops on the ground saw very little IAF activity. There were two reasons for that. Close air support requires close cooperation between the air and ground, and in the chaos of the first attacks this cooperation was lacking. The IAF could not acquire targets close to the front line on its own because it had little idea of

where the front line was and the Syrian air defense prevented the IAF from loitering above the battlefield long enough to find targets on its own.* Secondly, the Syrian air defense system, as noted, was denser than the one in Sinai. The IAF lost more aircraft on the Syrian front on 7 October than on any other day or front of the war. Providing the kind of close support sought by the Israeli infantryman would have resulted in still greater losses. The fact is that, with minor exceptions, the IAF and the line of strongpoints had effectively cut off the Syrian armor operating behind the Israeli lines from the infantry and logistic support it needed to hold its gains.

The Syrians cooperated in their destruction by dissipating their force rather than concentrating it. Though they had occupied almost half the Golan, they had consolidated their hold on none of it. Worst of all, from their point of view, was the fact that they had virtually no reserves. They committed all their armor and nearly all their infantry. Consequently when the Israeli counterattack came on 10 October the Syrians had no fresh troops and virtually no hope of redeploying other forces to meet it. Within 24 hours the Syrian attack was contained, the situation stabilized, and the bulk of Israeli reserves began arriving when the Syrians had already used virtually all available resources in the southern sector.

The Northern Penetration

The Syrian attack in the north apparently was designed to pin down Israeli forces and divert their

* The fact that the Israelis also lacked sufficient trained men and communications to effectively coordinate became apparent later in the war. The problem of acquiring targets and bringing effective strikes to bear on them is a difficult one in any case. On both fronts, the Israelis suffered greatly from prewar lack of training, the chaos of mobilization under unanticipated conditions, and the debilitating effects of Arab air defense systems. Though some of the problems were eased toward the end of the war, none of them was satisfactorily solved.

resources away from the main battle to the south. The attack was also to be the northern arm of a Syrian encirclement of Al Qunaytirah. The main route of advance lay a few kilometers to the north of Al Qunaytirah up a gentle slope which crested between two hills occupied by the Israelis. Beyond those hills the ground sloped down to the Jordan River, with few intervening hills. This route probably was chosen because the routes through Al Qunaytirah and south of it were constricted by hilly terrain and were more heavily fortified. An additional consideration may have been that the area south of Al Qunaytirah would become too crowded if all five Syrian divisions were trying to operate there.

The plan sounded good, but it quickly went sour. After making some progress crossing the cease-fire line, the Syrian 7th Division ran headlong into the Israeli 7th Armored Brigade, which had occupied a line between the two hills directly across the Syrian route. The Israelis had anticipated an attack in this area and had built dirt berms and firing positions between the hills, from behind which their tanks and antitank units could fire and move with minimal exposure. The distance from hilltop to hilltop was about four kilometers, and the ground to the east over which the Syrians were attacking was practically level except for the boulders and cracks in the Golani basalt.* The Syrians were stopped almost dead in their tracks here. The battle went on, with the Syrians occasionally able to push the Israelis back 100 meters or so, and the Israelis always being able to recover their original position but not able to push the Syrians back. The Syrians committed first the armor of the 7th Infantry Division and then the whole division against the Israeli brigade, one outpost, and scattered infantry troops. The fighting to the north and south was much lighter and largely confined to the immediate vicinity of the 1967 cease-fire line.

* As an area of extinct volcanoes, the basalt surface of the Golan Heights--although relatively flat--is marked by huge boulders and cracks in the earth which restrict cross-country movement.

The High Water Mark

As daylight came on 7 October the Syrians were still advancing, although slowly. The Syrian 1st Armored Division had entered the fight during the night and its leading elements entered Kafr Naffakh and were looking down on the Jordan around noon. By about noon the Syrians had made their deepest penetrations: measuring from Ar Rafid the Syrians had advanced about 25 kilometers to the vicinity of El Al, about 20 kilometers to the area of Al Yahudiyah, about 24 kilometers to Kafr Naffakh, and to within a few kilometers of Al Qunaytirah. In the north, however, only small gains were ever achieved.

Though Israel's position was still precarious, three of its reserve armor divisions were arriving on the Golan. First to arrive was Brigadier General Rafoul Eitan, in command of the 36th Reserve Armored Division. He came in during the night of the 6th before any of his unit had arrived. He was placed in overall tactical command of forces on the Golan, and his division was made responsible for the area north of the Al Qunaytirah - Benot Ya'aqov Bridge road. Major General Dan Laner and the lead elements of his 210th Reserve Armored Division also arrived during the night and took charge of the southern Golan area. Finally, Brigadier General Moshe Peled's 146th Reserve Armored Division began arriving during the 7th. By late in the day the Israeli position had solidified and some local counterattacks were undertaken.

The offensive to drive the Syrians back was laid out to begin with daylight on the 8th. The Israeli 210th was positioned directly to the west of the Syrian southern penetration and would press the Syrians back from there. The 146th was coming up from the south and would drive along the road paralleling the 1967 cease-fire line to retake the border settlements. The 36th would press the Syrians toward the south and reinforce the area lying north of the Israeli 7th Brigade, which was to be left in the pit with the Syrian 7th Division until the Israelis had accumulated enough force to begin a drive in that sector *(see foldout map 2)*.

During the 8th of October the Israeli 146th Division regained some 17 kilometers lost to the Syrians. A few isolated units reached the TAPLINE, where they were struck by Syrian aircraft and artillery. The 210th, pushing eastward from Al Yahudiyah, squeezed the Syrians back to the vicinity of Al Khushniyah, so the Syrians at the end of the day occupied just a small pocket about 15 kilometers long by five kilometers wide along the border from the TAPLINE to an area south of Al Qunaytirah. In the north, the 36th Division encountered much heavier resistance as it tried to make its way back to Al Qunaytirah. At the end of the day the Israelis claimed the recapture of the town, but UN observers saw Syrian troops there near sunset.

During the night the Syrians committed their only remaining major reserve force. The 3rd Armored Division and the Assad Force brigade followed the battered 7th Division into the "Vale of Tears", as the Israelis came to call the battlefield in front of their own 7th Brigade. This brigade had been fighting virtually without stop since 1400 on 6 October. By the morning of the 9th it was down to 40 operable tanks out of its original 105 and 10 replacements. More importantly, the brigade was very low on ammunition. The battle in the Vale of Tears reached its climax at about 1000 on 9 October. At that point 13 Israeli tanks, at least some of which were the last remnants of the 188th Brigade, moved just to the north of Al Qunaytirah out into the buffer zone that had separated Syrian and Israeli forces since the 1967 war. Just past the abandoned village of Ahmadiyah these 13 faced north and began shelling the Syrians. From their position the Israeli tanks were firing on the left flank and rear of the Syrians in the Vale. Apparently it was this attack from an unexpected quarter that broke the Syrian attack then in progress. The Syrians pulled back at a moment when some of the tanks of the Israeli 7th Brigade had little or no ammunition left.

By the afternoon of the 9th, enough of the 36th Division had arrived to relieve the 7th Brigade. All

day on the 10th the Israelis organized for the offensive into Syria and pushed the last Syrians back behind the 1967 lines. One brigade of the 146th Division continued northward after driving the Syrians out of the Golan and was subordinated to the 210th Division during the Israeli drive into Syria. By the end of 10 October Israel's deployment to continue its counterattack was complete. The bulk of the 146th Division had finished mopping up the Syrians remaining inside the 1967 border, had relieved the border outposts, and had taken up defensive positions. The 210th Division had closed on the border in the area just south of Al Qunaytirah. The 36th Division had retaken Al Qunaytirah and held the 1967 line north of the city. In the far north the rested and reinforced 7th Brigade and the just-mobilized Golani Infantry Brigade held the 1967 line extending up Mount Hermon to just below the former Israeli strongpoint, Position 102, which was still in Syrian hands.

The Hard Road to Sa'sa'

Until 11 October the bouldered and cut-up face of the Golan had worked in Israel's favor as it defended its hold on the Heights. From that point on the Golan's terrain favored the Syrians as they gave up ground to the Israelis. Many Israeli and foreign observers have expressed surprise at the tenacious defense of the Syrians as they fell back before the Israeli attack. The Syrian soldier had been written off after 1967 because of his flight before the Israelis when the Syrians lost what was supposed to have been a virtually unassailable position on the Golan Heights. The truer measure of the Syrian soldier's abilities in that war, however, especially on defense, was the experience at Tall Fakhr, where in 1967 the first Israeli penetration into the Golan was made. In these and nearby positions the Syrians stood and fought the Israelis with rocks and bare hands before being overcome. This same spirit characterized the Syrian fallback in 1973.

The Israeli offensive began at 1000 on 11 October, with elements of all three armored divisions moving across the cease-fire line. After only a little more than a day's rest, the 7th Brigade, as part of the 36th Division, rolled along the lower slopes of Mount Hermon, where the ground was smoother than the broken lava of the plain. The rest of the 36th Division moved parallel to and north of the road to Damascus, and the 210th and part of the 146th moved parallel to and south of that road. Below Al Qunaytirah the rest of the 146th Division held the line. On this day the Israelis had things very much their way. Resistance on the ground was relatively light. The IAF support on the Golan front reached its high point with over 400 strike sorties flown. All three divisions made good progress, almost 20 kilometers in some cases. The Syrian Army did not break and run, however, but fell back in order from one set of prepared positions to another. Unable to stop the Israelis, the Syrians slowed and bloodied them. The Israelis, moreover, advanced in a manner designed to minimize casualties by using heavy tank and artillery fire to open the way rather than making costly armor charges. This slowed them down and gave the Syrians a better chance to organize their defense.

The principal reason for the extent of the Israeli success on this day was probably the depletion of Syrian armored units against the Israeli 7th Brigade. The Israelis estimate that the Syrians lost 650 tanks in the Vale of Tears alone.* The total Syrian loss up to 11 October might have been some 800 out of the total of 1,100 committed at the start of the war. While this left the Syrians with an inventory of approximately 1,000 tanks, it would have taken some time to redistribute and organize them for defense.

The Israelis were helped on the northern edge of their salient by an Arab command and control problem that caused a gap to open between the northernmost

* At least 166 destroyed tanks were counted in the area [redacted] after the Israelis had begun to clear out the wreckage.

Syrian unit and the 1,800-man Moroccan contingent holding the crest of Mount Hermon. The Syrian unit was a brigade made up of members of the Druze sect, a Moslem minority. When ordered to move forward to meet the Israelis, a number of the troops reportedly refused, causing the gap. When the Israelis became aware of this they took advantage by moving into the gap and turning the flank of the Syrian 7th Infantry and 3rd Armored Divisions confronting the Israeli 36th Division in the center of the salient. The Druze commander is reported to have committed suicide as a result. The only hitch in the Israeli effort on the 11th was caused by a Syrian "shower" of antitank missiles that hit the first brigade of the 210th Division to cross the cease-fire line into Syria. This stalled the brigade, but the next brigade in line was able to pass through and overcome this opposition. It was the only time on the Syrian front that antitank missiles had a significant impact on the Israelis.

On 11 October, the first day of their counter-offensive, the Israelis penetrated 10 to 20 kilometers into Syria. The next day saw more of the same kind of fighting but the Syrian resistance stiffened somewhat. In the late afternoon, the Israeli 36th Division captured Mazra'at Bayt Jinn, just a few kilometers from Israel's farthest penetration in that area.

On the southern flank of the salient, however, the Israelis had tougher going. By late afternoon Laner's advance troops arrived in the vicinity of Kafr Shams at just about the same time that the leading armored brigade of the Iraqi 3rd Armored Division began to arrive in the same area. Feeling himself overextended, Laner pulled his troops back somewhat. Getting himself better organized Laner undertook one of the few deliberate night actions on the Syrian front, although fighting had gone on almost continuously since 6 October. At 0300 on 13 October one of Laner's brigades engaged, possibly from ambush, the leading Iraqi armored brigade and, by its own claim, destroyed 70 Iraqi tanks while losing none of its own. During the afternoon of the 13th one brigade of Israelis tried and failed to take a hill--Tall ash Shams--in the central portion of the salient.

A Syrian battalion held the hill with a few tanks, BMP infantry combat vehicles, and antitank weapons. The Israelis finally occupied the hill after a night ground attack launched by two battalions of airborne troops.

By early 14 October the Israelis had captured virtually all the territory that was to be theirs. That morning all units were told to hold their gains and to advance no farther. The advance halted on high ground near Sa'sa', some 30 kilometers south of Damascus. To hold ground was the major aim thereafter. Only two major actions occurred after the 14th--Israel's retaking of its former position on Mount Hermon and the combined Syrian-Iraqi-Jordanian counterattack of 16 October.

One of Syria's first targets of the war had been the Israeli strongpoint on the slopes of Mount Hermon called Position 102, which had been used for visual observation and Sigint collection since soon after the 1967 war. The Syrian 82nd commando battalion took the position on 6 October, killing 25 to 50 Israeli troops. On 8 October troops of the Israeli Golani Infantry Brigade tried to recapture the position but failed, losing 50 killed in the attempt. On 21 October the Israelis tried again and succeeded--at the cost of about 70 more Israelis killed. In the same operation, the Israelis lifted troops by helicopter to the highest peak of Mount Hermon, capturing it from the Syrians. The Israelis lost 145 to 170 men at Position 102, about 6 percent of all the fatalities suffered by Israel in the war. Among the plausible reasons for the Israelis' accepting such casualties at this place, the two most persuasive are the worth of Position 102 as a visual and electronic observation post and the Israelis' determination to salve their pride by not allowing the Syrians a victory there.

The largest Arab multinational operation of the war ended in a tragic fiasco. The plan called for a Jordanian and an Iraqi armor brigade to attack the southeast corner of the Israeli salient on 16 October. They would be supported by Syrian artillery and air strikes. The Jordanian brigade got off on time, but the Iraqis started late and contributed only a battalion. The Syrian artillery preparation was late

and arrived just as the Jordanians reached the Israeli lines, so the major damage inflicted by the Syrians was to the Jordanians. Similarly the Syrian Air Force arrived late and attacked the Iraqi battalion, apparently because they were the most easily visible tanks on the ground. At this point the Syrian operations coordinator called off the whole thing before still more damage was self-inflicted.

The Arab forces continued to attack the Israelis from time to time but none of them made any significant gains. The only successful Arab effort at this time was a small Jordanian gain on 19 October in the Jabal al Harrah area. Because the Israelis sought merely to hold their gains and diverted the bulk of their air effort to the Sinai, the war on this front appears to have simply petered out. The Syrians refused the first cease-fire on 22 October but finally accepted the second on 24 October.

The Sinai Front

Application of the Lessons of 1967

On the Egyptian Side

From the 1967 debacle the Egyptian military authorities had learned three main lessons: that they had to overcome the Israeli advantage in long-range tank gunnery with weapons that could be used by Egypt's less competent troops; that the Israeli Air Force had to be neutralized; and that Egyptian forces enjoyed a relative advantage when employed defensively. The planning and conduct of the 1973 war reveal how well the Egyptians applied these lessons.

Efforts to neutralize the IAF began in 1967 and proceeded along several avenues simultaneously. Extensive steps were taken to prevent it from again destroying the Egyptian Air Force on the ground. These measures included the construction of enough hard aircraft shelters to protect Egyptian fighters. Camouflage and deception measures included the construction of dummy shelters, the deployment of dummy aircraft, disguising aircraft shelters as dwellings, and the construction of shelters in villages located near airfields. To keep the IAF from again immobilizing the EAF by destroying runways, additional runways were built at every Egyptian airfield, and taxiways were widened and improved to serve as emergency runways. The new runways and taxiways were built at offset angles to make bombing more difficult. In some cases highways running near airfields were improved and connected via taxiways to the main runways so they could be used in an emergency. This was a major feat on the part of the Egyptian construction industry and began within six months after the 1967 war. In 1973 this effort paid off. Only about 20 EAF aircraft were destroyed on the ground, and

no EAF airfield was closed down for more than a few hours despite a dozen Israeli attacks.

Egyptian success against Israeli armor was mixed. The major improvement was in the willingness of infantrymen to use a new weapon to stand up to attacking tanks. This weapon was the unguided RPG-7 bazooka-type antitank rocket, which filled a gap the 1967 war had shown to exist. In 1967 the Israelis had used their armor, unsupported by infantry, in direct assaults on Egyptian positions. The lack of weapons to defeat the Israeli armor at close range often left the Egyptian infantryman with no choice but to run. In 1973 the Egyptians deployed the RPG-7 widely and the favored tactic was to set up RPG-7 ambushes in advance of the main Egyptian positions. The Egyptians could thus bring antitank fire to bear on the more vulnerable sides and rear of the Israelis. The tactic worked quite well until the Israelis adopted countertactics.

In tank-to-tank combat there seemed to be little or no improvement in Egyptian performance, although here too the Egyptians showed a greater willingness to fight. Adoption of the Sagger wire-guided missile was also intended to remedy a flaw evident in 1967 and showed Egyptian recognition of the superiority of Israeli long-range tank gunnery. The Sagger bridged the gap between the several-hundred-meter reach of the RPG-7 and the 3,000-meter maximum effective range of Israeli tank guns. The tactic here was to open fire at maximum range and keep firing until the Israeli tanks were closer than the minimum effective range of the missile, at which time the Israelis would be taking RPG-7 fire. When the Sagger scored a hit, it was an effective weapon. It suffered, however, the faults inherent in wire-guided missiles. It was relatively slow, requiring 20 to 30 seconds to reach maximum range. That often gave the target enough time to see and avoid the missile by taking cover or firing on the launch point. Since the missile had to be guided all the way to impact, fire directed at the launch point could, and often did,

cause the controller to miss the target. The Sagger could be set up to be fired remotely via a cable running from the missile to the launch and guidance controls. When used, this capability somewhat offset Israeli tactics. The vehicle-mounted Sagger had a cable for this purpose as much as 80 meters long, but was used less frequently than the remote cable of the man-packed Sagger, which was only about 10 meters long. Finally, the Sagger was difficult to control. Troops required continuous and intensive training, using a simulator designed for the purpose.

In the first two or three days of the war, the Egyptian antitank system inflicted heavy losses on the Israelis when they tried to use their armor according to the 1967 pattern. The most effective use of the antitank missiles was made from fixed defensive positions. Subsequently, however, the Israelis learned to spot potential ambush sites, recognized Sagger firing signatures and likely launch points, and began operating in conjunction with infantry teams to defeat the antitank missile. By the end of the 1973 war, the Israelis' armored forces had learned to operate effectively despite Egypt's antitank missiles.

The capacity and willingness of Egyptian infantry to defend a prepared position but inability to cope with rapid change and lack of central direction--as demonstrated in 1967--affected the fundamental strategy and organization of the Egyptian attack in 1973. The massive air defense buildup was designed to protect a large Egyptian force deployed in relatively fixed positions. The Egyptian canal-crossing forces were rehearsed and drilled in the crossing operation many times over. Motion pictures obtained by the Israelis as long ago as 1971 show an Egyptian exercise rehearsing the crossing of the canal by troops in small boats and the launching of a ponton bridge. Such training, conducted in full view of the Israelis on their Bar Lev Line, was intended to ensure that a minimum of control from the top would be necessary and that a maximum of surprise would be achieved.

The evident guiding principle of the Egyptians was to so thoroughly train the army to perform a fixed sequence of acts that the success of the crossing would be virtually guaranteed, barring overwhelming Israeli force on the canal.

The concept made maximum use of Egypt's abundant resource--manpower--in a way which vitiated Israel's advantages in mobility and small-unit flexibility. However, the Egyptians had given themselves a limited objective. Once that objective had been achieved all the old problems of unreliable command and control, overcentralization of direction, rigidity of tactical thinking, and poor training reappeared. The Egyptians had trained to win a battle, which by 8 October they had done. Sixteen days later, however, they were on the brink of losing the war.

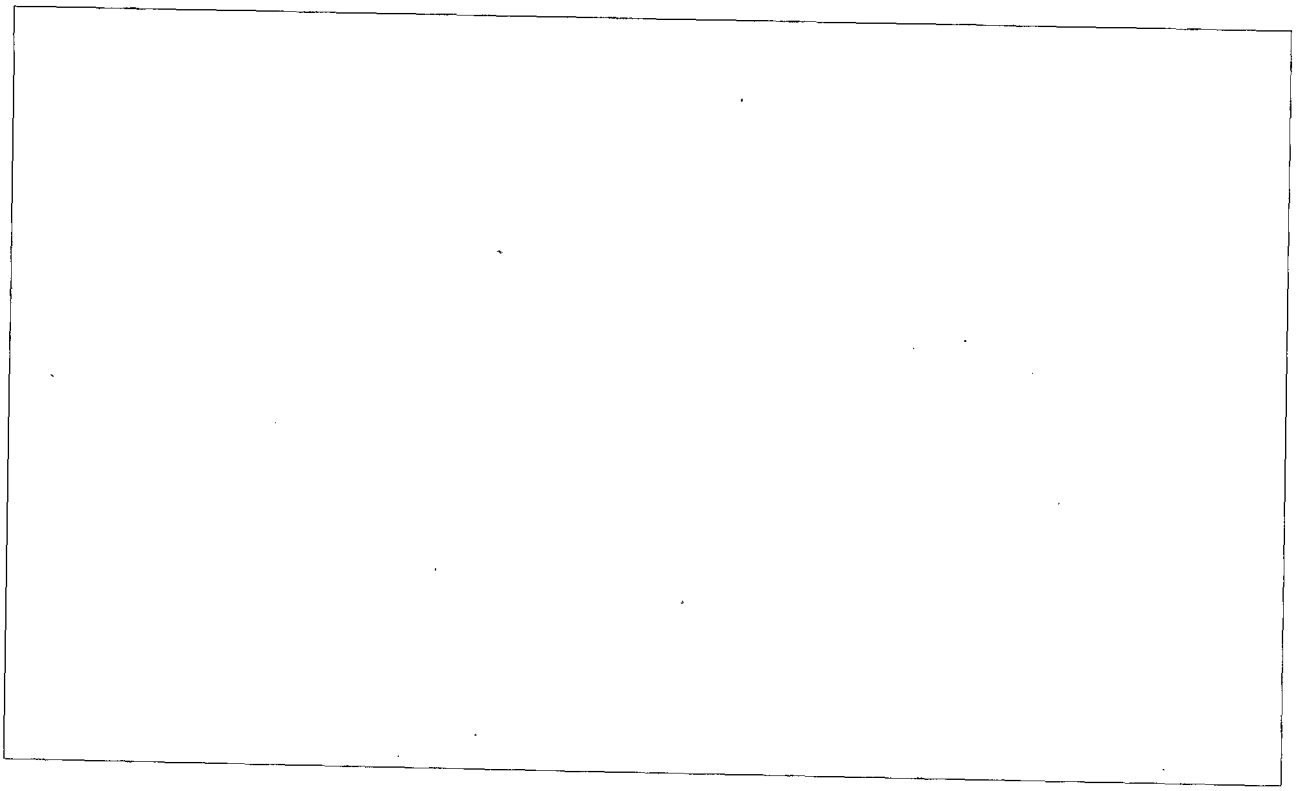
On the Israeli Side

The Israelis also learned lessons from the 1967 war. They learned that their air force was an all-purpose instrument capable of simultaneously attacking the enemy's air force and rear areas, providing close support to its troops and defending the airspace over Israel proper and the battlefield. They concluded that the tactics and techniques that won the 1967 war would be appropriate for another war. The Israeli soldier had always distinguished himself above his Arab counterpart by being better educated and trained, more highly motivated, and more willing and able to function in a rapidly changing situation. The Israeli military placed a high value on improvisation and creativity in military operations. These general propositions continued to be reinforced in Israeli training through 1973.

In one respect, however, the Israelis were hurt by their reliance on the IAF for ground support--so-

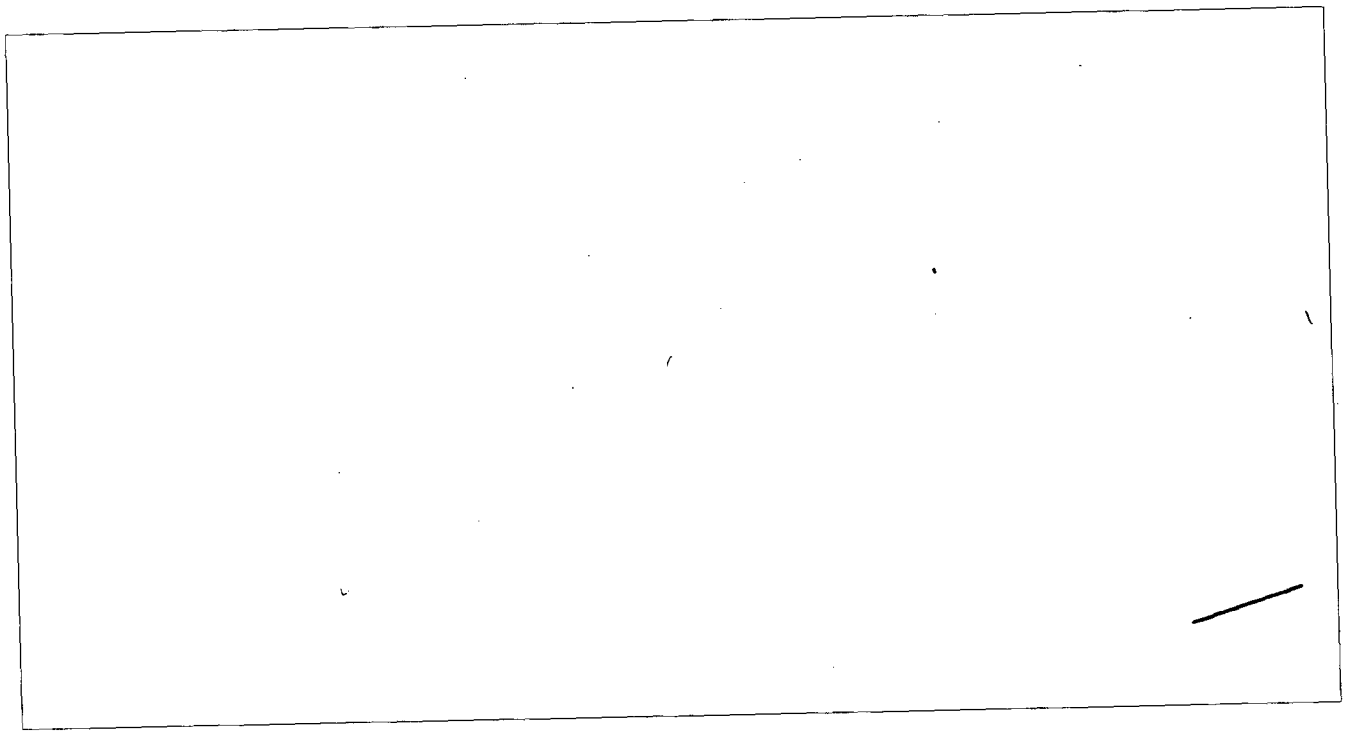
called flying artillery. This tactic, which proved successful in 1967, was nullified in 1973 by the unprecedented intensity of both Arab air defense systems, which reduced both the amount and effectiveness of the ground support the IAF could provide, especially in the first week or so of the war. In the face of this, the Israelis were left with inadequate artillery forces. While additional artillery almost certainly could not have stopped the Egyptian crossing, it might have slowed it and allowed the Israelis to reduce their initial tank losses by providing an alternative to unsupported armored sorties against the Egyptians. More artillery might also have allowed the IAF to avoid such great losses in futile attacks on Egyptian bridges across the canal.

What hurt the Israelis badly in 1973 was that they had learned to disdain and disparage the Egyptian soldier. That marvelous facility of the human brain to remember selectively allowed the Israelis to remember the Egyptian peasant soldiers who, in 1967, had thrown away their shoes in order to run faster in the sand, and to forget the Egyptian soldiers of the same peasant background who had returned again and again to the pass at Garadi to stall the Israeli drive along the Mediterranean coast. Gradually the Israelis convinced themselves that the Egyptians could not win and therefore would not attack; so the Israelis were, psychologically at least, unprepared for an attack. But this must be distinguished from the ability of the Israeli forces to absorb an attack, defeat it, and go over to a counteroffensive. By war's end the IAF was in fact simultaneously providing close support, air defense, and strategic attack on two fronts and doing it relatively well and with relatively small losses. Israeli armor did learn to cope with the antitank missile and did lead the Israeli counterattack, which was successful. The Arabs taught the Israelis a harsh lesson on 6 October, but that should not obscure the fact that by war's end the Israelis had demonstrated their generally predicted superiorities.



Preparations and Deployment

The first Egyptian activity that can be clearly associated with an intent to cross the Suez Canal by force was the emplacement of numbers of SAMs within range of the canal in the latter half of 1970. Hundreds of sites were constructed during the cease-fire, eventually to be occupied by real as well as dummy missile units. The dummies improved the survivability of the system by confusing and dissipating Israeli air strikes. The number of AAA pieces deployed in the area doubled within a year. During 1971 hundreds of additional revetments were dug in areas where troops and equipment would be assembled just before the crossing. New and improved roads were built connecting these areas with the canal. On the canal itself, the banks were cut and graded to allow the passage of amphibious vehicles and ferries directly into the water. In numerous places along the canal, areas up to several hundred meters long were leveled and graded to serve as



launching ramps for the ponton bridges which would carry heavy equipment across the canal. By the end of 1971, the mechanics of the Egyptian crossing plan were known to the Israelis

In the same period the Egyptians deployed their forces as they would for a crossing *(see foldout map 1a)*, dividing their army into three parts. The 1st Army was headquartered in Cairo and consisted of the last-ditch reserves: the 3rd Mechanized Infantry Division, the Presidential Guard Armored Brigade, and a miscellany of other combat units drawn from the large camps in the area of the capital. The 2nd Army, headquartered at Ismailia, on the canal, included the 2nd, 16th, and 18th Infantry Divisions, the 135th Independent Infantry Brigade, the 23rd Mechanized Division, the 21st Armored Division, and the 15th Independent Armored Brigade. The 3rd Army, headquartered at Suez, consisted of the 7th and 19th Infantry Divisions, the 6th Mechanized Infantry Di-

~~SECRET~~

vision, the 4th Armored Division, and the 25th Independent Armored Brigade. The only changes this deployment represented from the situation of a year earlier was the movement of the 25th Armored Brigade from the 1st to the 3rd Army, the shift of the bulk of the 6th Mechanized Division from the Cairo area to join its detached brigade in the 3rd Army area, and the movement of the 24th Armored Brigade from Cairo to join its parent 23rd Mechanized Division in the 2nd Army area.

With one crucial exception, all supporting arms were deployed well forward in the year before the attack. During that year, artillery in the canal zone was nearly doubled. Over the year or two preceding the attack, the Egyptians went almost entirely to landlines rather than radio for communications, and making the Egyptian command and control system more reliable up to the instant when the attack began. All that was lacking from the canal area until a few days before the attack was the heavy ferry and bridging equipment that would carry Egypt's armor across. This equipment was concentrated at two training areas on the Nile River north and south of Cairo. Since 1971 training conducted at these areas had demonstrated the ability of Egyptian engineers not only to erect the bridges but to operate ferries and rafts designed to get heavy materiel across a water obstacle even before the bridges could be built. It was probably the presence near the canal of these ferries, the heavy bridging, and a large increase in artillery of the Egyptian deployment that caused Israeli General Sharon to conclude that war would break out within 48 hours.

The Israeli preparations for a crossing included the Bar Lev Line, which sheltered troops on the canal's edge. The function of those forces was to observe and report on any Egyptian crossing and to harass the Egyptians to the best of their ability. The Bar Lev Line was not intended to be a desert Maginot Line. The Israelis also built a wall of sand some 50 feet high along virtually the whole length of the canal.

The Israelis' main defense force for the Sinai was the division-sized Armored Force Sinai (AFS), with 250 tanks deployed in small mobile units along the length of the canal and in a large mobile reserve at Bi'r Jifjafah, east of the canal. In the canal area the Israelis had built a series of roads parallel to the canal and small strongpoints which added up to a defense in depth stretching from the canal bank to the more easily defended passes 30 to 50 kilometers east of the canal across a relatively flat, open desert.

The Israeli defensive concepts did not envision stopping the Egyptians at the canal's edge. The main line on which a mobile defense would have been based, was a road parallel to and some 10 to 20 kilometers from the canal. Known as the Artillery Road, it was built to allow Israeli self-propelled guns to move quickly along the canal to respond to Egyptian artillery fire during the 1969-1970 War of Attrition. Israel's 1973 main line of defense formed along this road in the first 24 to 48 hours after the 1973 attack. The concept was sound as far as it went, but apparently the Israelis made the basic assumption that any Egyptian crossing would be sharply focused at one or a few main points. If the troops in the Bar Lev Line could pinpoint the crossings, the Israeli armor and aircraft could be directed to those points and hold the Egyptians in check until the reserves arrived.

The Israelis apparently did not plan on what to do if attacked by Egypt and Syria simultaneously, what to do if the Egyptians crossed the canal in massive numbers and at many points, or what to do in the event of a military surprise. These were all symptoms of the arrogance and tunnel vision of which the Arabs, and not a few Israelis, accuse the pre-October Israeli military command. Another aspect of Israeli defensive preparations that failed was the 50-foot sand wall. The wall was built as a delaying device the Egyptians would have to cut through in order to land heavy weapons and equipment. The Egyptians, however, used high-pressure water hoses to wash the wall away in only two or three hours rather than the six to eight hours the Israelis had allowed

for in their plan.* The wall withstood Egyptian efforts longer in the southern sector because of its high clay content.

The Israeli deployment consisted of the normal AFS headquarters, one armored brigade, and most of the armor of three mechanized brigades at Bi'r Jifjafah, and elements of three mechanized brigades strung along the canal. Near Rafah, on the coast just inside the Gaza Strip, two additional armored brigades constituted the normal reserve and security forces for the Strip. Because of the strung-out deployment of the Israeli forces along the canal, the actual force facing the Egyptian crossing was small. The Bar Lev bunkers were manned by a total of fewer than 600 troops deployed in garrisons ranging from 10 to 20 men each. The twin bunkers opposite the Al Firdan Bridge--a major Egyptian crossing site--had a total of about 30 men in them. Backing up the bunkers were numerous armor positions manned by tank platoons of four or five tanks each. Facing the Egyptian artillery the Israelis had one artillery brigade of 50 to 60 self-propelled 155mm and 175mm guns.

The Crossing

The actual crossing was accompanied by a 50- to 55-minute artillery preparation which began 15 minutes before the troops pushed off from the west bank. In the first 15 minutes, [redacted] the Egyptians fired 100,000 rounds at 543 distinct Israeli targets using 2,000 artillery pieces. The targets consisted of all the Bar Lev bunkers and all known fortifications, military concentrations, and command and control targets within range. The first troops used rubber boats to cross and carried rope ladders which they affixed to the Israel sand wall to help subsequent troops to climb

* The Israelis observed an Egyptian exercise in which hoses were used to cut through a simulated section of a sand wall in December 1971. They failed to determine that this method of breaching their canal wall would be used in a real attack.

the steep incline. They carried antitank missiles and many rifle grenades. The purpose of the rifle grenades was to keep the Bar Lev bunkers under fire between the time the Egyptian barrage was lifted from the bunkers and the time when the troops landed and got a foothold on the east bank. Subsequent waves followed--12 in all--at 15-minute intervals until five to ten brigades of infantry had crossed the canal. These troops had two missions. The first groups were heavily equipped with Sagger and RPG-7 antitank missiles. They were to move farther inland and set up ambushes to neutralize the Israeli armored counterattack the Egyptians were certain would come. Later arrivals were to isolate and assault the Bar Lev bunkers.

By the end of three hours the first ferries began to operate and a start had been made on building the bridges. An example of the detailed planning that went into the operation is the fact that some bridge sections were towed across the canal so they could be assembled under protection of the Israeli sand wall.

From just before 1400, when the artillery barrage started, until the middle of the night, the Egyptians' main effort focused on building up their presence on the east side. Evidently little attention was paid to unit formations, and the crossing forces quickly became disorganized. Several Israeli witnesses describe a mob scene as troops poured onto the Israeli side and milled around until they could get themselves sorted out. It was a vulnerable time for the Egyptians, but they were covered by continuous artillery and heavy antiaircraft fire. Toward midafternoon the first assaults on Bar Lev bunkers were staged and several fell quickly. Others, however, held out stubbornly. One held out throughout the war. This was Fort Budapest located on a narrow strip of land east of Port Said. Egypt's 135th Independent Infantry Brigade was unable, despite repeated efforts, to take Budapest. At the Al Firdan Bridge, one of the twin bunkers held for three days, apparently taking a heavy toll of the attackers as the Egyptians tried to take the fort by frontal assault. The other held for another

few hours and its garrison escaped, apparently while the Egyptians were preoccupied with the final assault on the other bunker.

The first Egyptian tanks landed on the east bank at about 1600 local time on 6 October. They were carried by rafts and were seen unloading by Israeli armored detachments fighting delaying actions. Rafts and ferries were the workhorses of Egypt's efforts in the first 24 hours and probably during daylight hours through most of the war. By 2100 on 6 October Egypt had some 40 self-propelled heavy ferries working and they had delivered 100 tanks to the east bank. During the day, [redacted] at least some of the more vulnerable ponton bridges were swung parallel to the shore and camouflaged.

The Israeli reaction to the Egyptian crossing was hampered by the failure of the Israeli Sinai commander to implement the existing contingency plan in time. Though General Gonen was warned of the impending war early on 6 October when Israel ordered its mobilization, he did not redeploy his forces.* The normal deployment scheme called for only a third of the AFS to be in the canal area, while the remainder was concentrated at Bi'r Jifjafah. The plan called for the movement of another third of the AFS to the Artillery Road vicinity on warning of an attack while the remaining third was held in reserve to meet a breakthrough or to defeat the main attack. Gonen was censured for his failure by the Agranat Commission of Inquiry into the war. The criticism was based on the assertion that if the Israelis had had more armor available, deployed in proper positions, they could have stopped the crossing or at least severely disrupted it at more acceptable cost.

[redacted] claim that Gonen's failure was really a blessing in disguise. The Egyptian artillery preparation, [redacted] was so heavy

* In his defense, Gonen was told to expect an attack at 1800 local time, but to do nothing which might be construed as provocative. As a result, he ordered the AFS not to move forward until 1500-1700 hours. As the day wore on, his own apprehensions and those of AFS commander General Mendler caused them to order the move minutes before the war started.

that virtually anything exposed would have been destroyed. If the Egyptian plans were followed, nearly 200,000 rounds of artillery fire were poured onto the Israelis on the first day of the war. Even fire this heavy, however, almost certainly would not have destroyed substantial numbers of Israeli tanks deployed to oppose the crossing. Israeli data indicate that Israel's own artillery destroyed little Arab armor, although near misses did shear off radio antennas, lights, machine guns, and other external gear. Moreover, the number of rounds ostensibly fired by the Egyptians seems large but, spread over 12 hours, over 500 targets, and the 1,600 square kilometers of the Israeli-occupied east bank of the canal, the density of rounds was not great.

Israeli tank losses in the first 24 hours of the war are hard to establish. The Israelis began the war with 250 tanks in the Sinai. Within 24 hours, 150 to 160 of these were out of action, although many were repaired and returned to service within periods of several hours to several days. Some units were almost wiped out. The brigade in the Al Qantarah sector was reduced from 50 tanks to 11 by early morning of 7 October. The major cause of these losses probably was the Egyptian antitank missiles employed from ambush by troops who crossed early and moved five to ten kilometers inland from the canal. Also effective were antitank missiles fired from the mounds the Egyptians had built along the west bank *(see illustration on page 17)*. These mounds provided Egyptian Sagger and tank crews with a broad field of fire extending into the east bank area. Antitank missiles were the primary cause of Israeli losses in the first two or three days of the war. The Israelis' use of unsupported tanks made them vulnerable to Egyptian infantrymen armed with portable antitank weapons. The Israelis had simply failed to recognize that antitank missiles would require them to change their tank tactics.

The Egyptian RPG-7 and Sagger antitank missiles undoubtedly took a heavy toll of Israeli armor in the first several days of the war. Egypt's foresight in providing its infantry with large numbers of these weapons and Israel's mistake in not taking these weapons into account in developing its armor tactics before the war account for most of these

losses. In accounts immediately after the war, however, the effect of the antitank missiles was exaggerated. Detailed information now available indicates that in the whole war the Israelis lost approximately 500 tanks; among these are 119 disabled units [redacted] at least 6 percent, but no more than 25 percent, were killed by Saggers.* No data are available for RPG-7 effects; it appears that the RPG-7 did not destroy many tanks but did enough damage to knock some out of combat.

The sample of 119 Israeli tanks [redacted] is not an unbiased one. Many disabled Israeli tanks are in Egyptian hands, [redacted] Undoubtedly a significant percentage of those were damaged or destroyed by Saggers. The sample does not include damaged tanks that were repaired. It is probable that Saggers damaged more tanks than they destroyed, but we now have no way to measure that effect. Most damaged tanks were repaired during the war at field depots. The Israelis were often remiss about keeping records, so the relevant information on cause of damage is probably not available even to them. Moreover, the Syrians did not use antitank missiles nearly as much as the Egyptians did.

One factor key to the Israelis' losses in the first days of the war was their failure to give the Egyptian soldier due credit for his ability to fight on the defensive. This capability was the essence of the Egyptian plan: to rapidly seize a limited territorial objective and then defend it. Tactical doctrine contributed further to the losses by leading the Israelis to attempt to relieve the Bar Lev bunkers that rapidly came under siege. Small tank forces trying to rescue the garrisons ran into antitank missile ambushes. It was not until the third

* The wide range in estimated Sagger destructions is due to the presence of more than one potentially killing hit on the same tank and uncertainties in identifying the weapon scoring a hit. In total, 8 tanks were definitely destroyed by Saggers, 11 had multiple hits, and 18 others were possibly destroyed by Saggers.

or fourth day of the war that the Israelis authorized the remaining isolated garrisons to surrender if further resistance seemed pointless. The Israelis had always set great store by the morale-boosting doctrine that no Israeli dead or wounded would ever be left behind and this idea had been fixed in Israeli doctrine. The Egyptian military command knew this, counted it an Israeli weakness, and used it to set the ambushes which caused the worst of the Israeli losses.

The 7th and 8th of October were devoted largely to consolidation by both Egyptian and Israeli forces. The separate bridgeheads established by each of the five infantry divisions which crossed the canal were linked together into a continuously defended strip the length of the canal and roughly ten kilometers wide. It was up to 20 kilometers wide in the far north both because there were more Egyptian troops there and because the terrain was more open and they were able to move more quickly. The Egyptians began at once to fortify their holdings. Trenches and fox-holes were dug, wire strung, and minefields laid in the pattern that has become familiar through use by the Egyptians in their last three wars [redacted] It was obvious that the Egyptians anticipated a furious Israeli reaction and had chosen to meet it in the way that gave them their best advantage--defensively.

During the 7th of October the first Israeli reserve forces began to arrive. Before the middle of the 8th of October the bulk of two reserve armored divisions--the 162nd under Major General Adan and the 143rd under Major General Sharon--were deployed in the passes and along the Artillery Road. Until the war began Adan had been commander of the Israeli Armor Corps. His appointment illustrates one method the Israelis use to mobilize quickly--convert administrative and school commands to operational commands. One of Adan's brigades was formed around the staff and equipment of the Israeli armor school, and the brigade commander was the commandant of the school. Sharon represents another method of rapidly mobilizing units--recalling senior, experienced officers who had recently retired. Sharon had a long and

Approved for Release: 2012/09/04

distinguished career in the IDF beginning during the 1948 war of independence. In 1956 he had been a brigade commander and in 1967 the commander of a division-size task force. Until July 1973 he had been commander of all Israeli forces in the Sinai. He had retired because he believed his right-of-center conservative political views would keep him from being appointed to Chief of Staff, the senior Israeli military post.

On the second day of the war the Israeli deployment had the 162nd Armored Division minus most of its artillery opposite Al Qantarah, the 143rd Division opposite Ismailia, and an independent armored brigade opposite Suez. The remnants of the AFS were regrouped into a brigade and placed under the 162nd Division. The Egyptians continued to move the men and equipment of five infantry and three mechanized divisions across the canal. At least some of the ponton bridges had been hit by Israeli air attacks and some others may have been dismantled during the day to protect them, but others continued in use to facilitate the crossing of heavy equipment and supplies. Ferries played a large role in moving tanks across. By the end of the second day the situation was stable. There were still and there would continue to be occasional hot firefights as the Israelis and Egyptians sought to improve their positions, and the Israelis staged several strong thrusts toward the canal, all of which ultimately failed. But the main lines that would hold until 15 October were reached by early on the 8th.

The Bridges

[redacted] about half the bridges used were built in Egypt either under license from the UK--Uniflote self-propelled bridge/ferry units--or local copies of Soviet World War II pontons. According to some reports, some of these pontons were filled with styrofoam to keep them afloat even if damaged. They were assembled in either of two ways. The Soviet PMP bridge section is designed to be launched off its truck carrier into the water.

It then unfolds and automatically locks into a flat, floating section which can be connected quickly to others to form either a bridge or raft. These were probably assembled using the long graded sections of the canal bank. The sections probably would be hooked together parallel to the bank and then the completed bridge, or all but the last section or two, would be swung across the canal to connect with a gap in the Israeli sand wall. Other bridges were reportedly assembled by dropping pontons into the water, attaching decking to them and assembling a number of units into a bridge, a slower process than the PMP. Some sections were towed across the canal where they could be assembled under the Israeli sand wall. Egyptian assault forces and artillery prevented the Israelis in the Bar Lev bunkers from interfering effectively with these operations. The Israelis did not have sufficient long-range artillery to seriously impede the Egyptian crossing although they tried. Aircraft also tried to cut the bridges, with little effect and the loss of 32 aircraft.

Recognizing the vulnerability of supply via bridges and rafts, the Egyptians immediately began building pipelines across the canal. A double pipeline was built in each army area and carried water and POL across.

The sand wall was pierced by high-pressure water jets. The jets were powered by West German fire engine pumps installed in small barges floating in the canal. The technique had been used in the construction of the Aswan High Dam and was suggested to the military by the Egyptian engineer who had perfected the system. In their search for a way to penetrate the wall the Egyptians had tested explosives and earth-moving equipment and found high-pressure water to be the quickest. It took the Egyptians two to three hours to make a gap in the 2nd Army sector of the wall, where it was composed of loose sand. In the 3rd Army area, however, there was a lot of clay mixed with the sand and it took somewhat longer to establish bridges across the southern sector of the canal. According to one report, the Egyptians initially sent some armor and

heavy equipment of the 3rd Army across the canal on the northern bridges and moved it south on the Israeli side of the canal. Within the first day, however, the Egyptians had discovered or created gaps in the wall that permitted the 3rd Army to move supplies and some heavy equipment across the canal via ferry.

The first priority in the Egyptian crossing, [redacted] was to neutralize an Israeli system for pumping inflammable fluids into the canal and setting them afire. A frogman unit is alleged to have put the system out of operation during the night of 5-6 October. The Israelis discovered this on the 6th and an engineer sent to correct the blockage was one of the first Israelis captured in the war. From the Israeli side the story is somewhat different. Only two operational systems to pump gasoline on the canal had been installed when the war broke out. One failed to work when needed and the Egyptians did not cross in the area where the other was installed. [redacted] the other systems that the Egyptians sabotaged were dummies. In any event, the canal was not set ablaze.

The Israeli response to the bridges was rapid, massive, and ineffective. Aircraft attacked the bridges for the first four days of the war without seriously impeding the flow of men and supplies across them. With the bridges, ferries, rafts, and the air defense system, the Egyptian supply line was virtually invulnerable. The Israelis did hit bridges and rafts both from the air and with artillery, but they had no weapon big enough to damage enough of a bridge to put it out of action for more than a few hours. The Egyptians responded not only with antiaircraft fire but by frequently moving the bridges and actually dismantling some of them during the day. Camouflage was used to hide the dismantled bridges, and smokescreens were used to protect some bridges under attack.

Sitzkrieg: 8-14 October

During the 6th and 7th the Egyptians had made their deepest penetrations into the Sinai in the northern area around Al Qantarah, gaining as much as 20 kilometers. Consequently it was in this sector that the Israelis staged their first major counterattacks and suffered their worst setbacks of the war. The Israeli 162nd Armored Division was ordered to attack early on 8 October with the apparent objective of capturing one or more Egyptian bridges in the vicinity of the Al Firdan Bridge. Two armored brigades made the attack and through the morning made good progress. Elements of one brigade may even have reached the canal. In the late afternoon, however, the tables were turned as the Egyptians reacted to the attack and brought the heaviest antitank missile fire of the war to bear. By sunset the Israelis had been beaten back, with heavy losses in tanks and men.

In the course of this attack, the Israeli 190th Regular Armored Battalion, commanded by Lieutenant Colonel Yagouri, ran into a large Egyptian ambush in the Al Qantarah area. His unit was virtually destroyed and he was taken prisoner. The main effect of the defeat was produced by the appearance of Colonel Yagouri on Egyptian television received in Israel. His appearance drove home to the Israelis what a struggle they were in, while at the same time raising Egyptian morale considerably.

After the costly lesson of the 190th, the Israelis settled in to hold their position while amassing their reserves, and things reached a standoff. Each side was evidently waiting for the other to come to it. The Israelis were hoping the Egyptians would try to penetrate deeper into the Sinai on the theory that in so doing the Egyptians would move out of their air defense cover and cause their antitank defenses to thin out. Under these conditions the Israelis could hope to administer a 1967-style beating and send the Egyptians fleeing back across the canal. On their side, the Egyptians knew what the Israelis wanted and were determined not to give it

to them. Their plan called for a period of several days--called an "operational pause"--during which the Egyptians hoped the Israelis would hurl themselves at the Egyptian phalanx along the canal. The Egyptian crossing plan called for the Egyptians to advance only after the Israelis had been considerably weakened in futile attempts to break the Egyptian front on the canal.

If the battle lines were relatively static in this period of the war, the fighting was not. The Egyptians launched small-scale attacks several times a day through the 13th. Most were directed at the passes, but some headed south along the Gulf of Suez coast. They were usually beaten off easily as they were staged according to a stereotyped plan and moved very slowly--that is, Egyptian tanks would advance followed by troops in armored personnel carriers. At a distance of two kilometers or so the infantry would dismount and advance on foot, accompanied by the tanks. Given the unvarying pattern of these attacks, the lack of cover and concealment along the canal, and the high quality of Israeli tank gunnery at the ranges involved, these Egyptian forces were under almost continual accurate fire. The motive behind these attacks is unknown. Most likely they were designed to prod the Israelis into rash counterattacks that would be stopped by Egyptian antitank ambushes. After the first two or three days of the war, however, the Israelis stopped playing the Egyptians' game. For the Israelis' part, they spent the time building up their defense, preparing for their counteroffensive and improving their lines with localized counterattacks. In this period the Egyptians were squeezed into the final enclave, which averaged only 5 to 15 kilometers wide.

This period drew to a close on 13 and 14 October. Beginning on the 12th and continuing during the 13th the Egyptians brought their two armored divisions across the canal--the 21st in the north and the 4th in the south. Their mission, apparently, was either to initiate phase two and take the passes leading into the interior of the Sinai, or to divert the Israelis from their drive against Syria. We cannot

conclusively choose between these alternatives because, while the timetable called for phase two to begin about the 14th, the conditions on which it was to be launched had not been met. Rather than having been seriously weakened in the first week of the war, the Israeli forces in the Sinai were growing stronger, and other Israeli forces were being diverted from the Syrian front by the 12th and 13th. If the Egyptian motive in bringing the armored divisions over was to aid Syria, it was certainly a halfhearted effort. The attacks by these divisions followed the same basic pattern as the smaller attacks during the preceding few days.

In the 2nd Army area, the 21st Armored Division sent two of its brigades in against Israeli General Sharon. Of the 200 to 210 tanks in these brigades, 118 were lost--almost entirely to Israeli tank fire. In the 3rd Army area, one brigade of the 4th Armored Division attacked the Mitla Pass area while the armored brigade of the 6th Mechanized Infantry Division tried to break out to the south toward Ras as Sidr. Both attacks were stopped cold, but with fewer losses than the 21st Division suffered. The brigade of the 6th Mechanized Division lost virtually an entire battalion--30 tanks--when it was trapped in a wadi. Later that day the brigade of the 4th Armored Division was driven back, with the loss of about 50 tanks. By day's end the breakout attempt was over at the cost of more than 200 Egyptian tanks. The Israelis had lost very little, either because they had ambushed the Egyptians or because they had fired on them at long range.

Into Africa

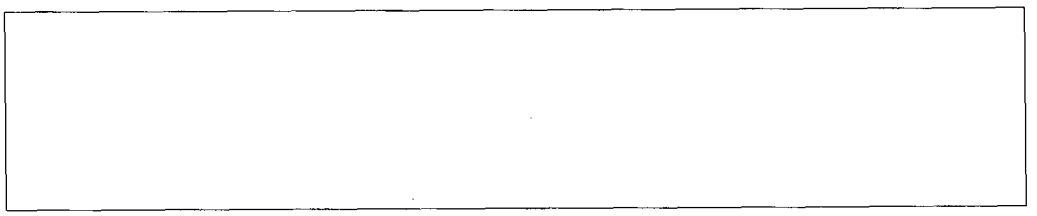
The Israelis had first entertained thoughts of crossing the canal in 1967, as evidenced by the fact that some Israeli commanders later lamented the fact that Israel had not done so then. Certainly on 9 June 1967 the only thing that could have stopped the Israelis was lack of bridging and ferry equipment. They had tested their ability to cross significant water obstacles by raiding the Red Sea coast of Egypt in

September 1969 and in maneuvers conducted in the Sinai in 1972. General Sharon claims that, while he was commander of Israeli forces in Sinai, he had prepared for a crossing, probably in anticipation of staging a large raid in the event of another war of attrition. To this end he had marked a certain section of the Israeli sand wall to be used for a crossing; the section had been built in a way intended to make it easy to knock down during the operation.

The first crossing effort was the ill-fated attempt to seize an Egyptian bridge on 8 October. No further effort was made until the successful crossing a week later. By then, operations against Syria had been completed, and with the defeat of Egypt's breakout attempt, the consequent heavy Egyptian tank losses, and the completion of the Israeli buildup in the Sinai, the time was opportune. The following account of the crossing operations combines various sources of information, mostly Israeli.

The initial crossing was carried out by General Sharon according to a plan which--typical of him--was both complicated and bold. Preparations began about 12 October when General Adan's 162nd Division was ordered to slide leftward from its position opposite Al Qantarah to a position just north of and behind Sharon's 143rd Division opposite Ismailia. This move was completed by early 15 October and was not detected by the Egyptians. The gap left by the move of the 162nd Division was filled by a task force composed of an infantry brigade and a mechanized brigade.

The crossing operation began late in the afternoon of 15 October with four of Sharon's brigades moving off from Jabal Tasa toward the canal on a staggered schedule, the mission of each dependent upon the successful completion of the others' missions. At 1700 an armored brigade commanded by one Tuvia* attacked



due west from Jabal Tasa into the 21st Armored and 16th Mechanized Divisions of the Egyptians. This was to divert Egyptian attention from the canal and to pin down a significant fraction of Egypt's armor in the area to prevent reinforcement of its forces at Israel's chosen crossing site. At 1800 Amnon Reshef's brigade (probably the 14th Regular Armored) struck out for the canal. Reshef gave at least two of his battalions the mission to get behind the 21st Division and drive it northward away from the crossing site to open the way for the crossing. One battalion--the 79th--reached the crossing site undetected. It then turned north and moved several kilometers along the waterway hoping to capture an Egyptian bridge. Another battalion to the right of the 79th, however, ran into stiff opposition and was stopped. The 79th was called back for fear the Egyptians would exploit its exposed right flank.

The remainder of Reshef's brigade secured the crossing site itself. As soon as this was done the leading battalion of Dan Matt's airborne infantry brigade moved to the canal side with support and engineer gear and crossed in rubber boats. The paratroopers were to secure the bridgehead and probe the east (Egyptian) bank. As soon as the airborne brigade had signaled its initial success, Chaim's M-60 armored brigade moved a battalion (about 30 tanks) to the canal. They crossed as quickly as possible, reportedly using Uniflote bridge sections as ferries. The Israelis cut through their sand wall with commercially available earthmoving equipment.

At no time did the Israelis consider this operation anything but an all-out effort to turn the tables on the Egyptians and set them up for a major defeat. This is not to say, however, that the Israelis had not prepared contingency plans to withdraw quickly if opposition proved much stiffer than expected or if their plans went seriously awry. The stories about the Israelis exploiting the unexpected success of a small commando raid was part of the Israeli attempt to confuse the Egyptians and minimize the true extent of the Israeli plan.

~~SECRET~~

The first paratroopers got across the canal at about 0100 on 16 October and the first tanks were operating on the west bank by 0600. There remains some confusion over the method of Israeli crossing. Reports from a number of sources on both sides relate that the first crossing used captured amphibious tanks crewed by Arabic-speaking Israelis. The only evidence bearing on this point is a single photograph of a captured PT-76 in Israeli service published in a paperback history of the war. The caption reads: "Tank breaking through to bridgehead receives farewells." *(See photograph, above.)* The Israelis deny

the use of any such ploy and claim that on that first day they used only the Uniflote sections to ferry their tanks across. Some reports combine fragments of both stories.

Regardless of the equipment and ploys involved, the Israeli method of operation was to maximize Egyptian confusion. The first tank battalion across split up into columns of a few tanks each and a few infantrymen and fanned out to probe the Egyptian deployment. When the Egyptians characterized the Israeli force on the west bank as being composed of seven tanks they may well have thought that the multiple reports they were receiving all referred to the same one or two groups rather than ten or so different groups.

Egyptian reaction to this Israeli operation was immediate and furious though initially confused and uncoordinated. Tuvia's and Reshef's brigades were tied down in heavy fighting all night long. One battalion of Reshef's brigade pushed as far north as the "Chinese Farm"--an abandoned experimental farm set up as an aid project by the Japanese in early 1967--before being stopped.* If the Egyptians had trouble deciding just what the Israelis were intending when they crossed the canal, they had no trouble deciding that stopping the operation should take priority in their operations. Consequently, the Egyptian 21st Armored Division and 25th Armored Brigade were ordered turned toward the crossing site and pressed as hard as they could to close the narrow corridor the Israelis had cleared to the canal.

During the 16th the remainder of Chaim's brigade crossed the canal, so the Israelis had two brigades in Africa--one armored and one infantry. In addition General Sharon brought his command group over so that

* When the Israelis first occupied the area they thought the markings indicated a Chinese project, and the name stuck. The area was chosen for an irrigation project because it was reasonably near fresh water piped from the west side of the canal and the land was flat and open--characteristics which made for the kind of nose-to-nose tank battle which developed there.

he could stay in close touch with the fighting. General Adan's division was preparing to cross over as well, but was temporarily diverted by an Egyptian effort to close off the corridor from the south.

[redacted] As a result elements of two tank brigades from Adan's division and at least part of Reshef's tank brigade broke off their other activities and moved southwestward behind the whole Israeli crossing force and set up an ambush. The Egyptian 25th Brigade was virtually destroyed within 15 minutes while the Israelis suffered no loss at all. Then the Israeli units returned to their previous positions. Another of Adan's brigades, that of Gabbi Amir, was held in Sinai for several days to fight off a series of Egyptian counterattacks. This indicates the intensity of the Egyptian effort to stop the Israeli crossing.

The Battle of the Chinese Farm was a horror story. The Israelis claim to have destroyed about half of the 300 or so tanks the Egyptians threw into the area. They lost 50 to 60 of their own tanks in the process. While tanks were the predominant force in the battle, artillery and mechanized infantry units got involved. The fighting was often at point blank range and, since there was no place to hide or maneuver, the affair turned on rapid accurate shooting and small-unit leadership. The fighting also involved an Israeli attempt to drive the Egyptians off a nearby hill codenamed Missouri. The battle lasted through the night of the 15th and most of the 16th until the Egyptians were finally beaten back far enough to leave the Israeli corridor relatively secure. Even so, at night Egyptian commandos, infantry, and light artillery groups filtered into the Israeli-controlled area to harass the Israeli supply route. At several points during the nights of 16-19 October the traffic through the corridor had to stop until Egyptian infiltrators could be cleared out. While the supply line was out of the direct line of fire of Egyptian tanks, Egyptian artillery could and did harass the Israelis constantly. Never able to

knock out any of the Israeli bridges completely, Egyptian artillery and rockets did score hits on them.

While the crossing could be called a bold stroke, the Israelis exploited it carefully. First, the site was chosen with an eye for local defense. Located at the point where the canal enters the Great Bitter Lake, the site was protected on its left flank by the lake itself. Marshes along the lake shore and canal side helped protect it against armor assault from the right. Sharon had wanted to leap across the canal with two divisions at the outset and head for Cairo, but he was overruled by the high command. His mission was to secure the crossing and hold the northern end of the Israeli bridgehead west of the canal. Sharon operated alone through the 16th. General Adan's division began crossing during the 17th. Once across the canal Adan found that at least one Egyptian mechanized infantry brigade was based on the road to Cairo, a few miles west of the crossing site. Prudence demanded that the elimination of this unit be accorded first priority. On the 17th Amir's brigade crossed the canal and took out the Egyptian brigade. We know little of the fight but it must have been tremendous, for scattered photography shows at least one battalion virtually destroyed where it stood some 15 to 20 kilometers northeast of the Israeli site. Israeli testimony holds, moreover, that the Israeli field hospital set up at Fayid (Fa'id) Airfield on 17 October treated "hundreds of wounded" during the first 48 hours the hospital was open.

On top of and concurrent with these operational considerations the Israelis were running into traffic problems. They were trying to move two armored divisions over narrow desert tracks or asphalt roads to and through a narrow passage against severe, if rather uncoordinated, opposition. The roads backed up as each interruption by Egyptian fire disrupted movement. The Israelis also had trouble getting their bridging equipment into line. The original plan was to install a roller assault bridge (RAB) early on. The RAB was an Israeli invention consisting of floatable rollers supporting a roadbed. It

was to be assembled on land and towed to the canal by a specially trained tank company. That company, however, got caught up in other aspects of the war, and the untrained tank company that did try to tow the RAB on the 15th and 16th ran into many delays. The first bridge, then, was improvised of Uniflote sections and a tank-launched assault bridge to cross a gap caused by the loss of one Uniflote section.

By 18 or 19 October the Israelis were beginning to benefit from the more fluid situation they had created. They operated in a number of independent columns, either smashing through resistance as they met it or bypassing it. The town of Fa'id was taken on the 18th. It was the 19th before Adan's entire division was across the canal. Adan's division was to head south along the Great Bitter Lake with the object of cutting off the 3rd Army--or that part of it in the Sinai. On the 19th a third Israeli unit began crossing the canal: a task force under General Magen drawn from the 252nd Division at the south end of the canal.* Magen's force secured the west flank of the Israeli enclave as Adan drove south. Despite this overwhelming force the Israelis were making slow progress.

[redacted] Information from the book by military historian Chaim Herzog concurs that Magen commanded the task force in the north but makes no mention of a division under Meron. Herzog says that the southern sector was held by the 252nd Division, commanded by Major General Avraham Mandler, until his death in an Egyptian artillery barrage near the Giddi Pass on 14 October, when General Magen assumed command. In this report Herzog's account has been accepted because [redacted] Herzog's account is complete and convincing in its details.

Having taken Fa'id on 18 October--an advance of some 15 kilometers--the Israelis had only gained another 20 to 25 kilometers by midday on 22 October just before the first cease-fire took effect. This placed the Israelis only about halfway to Suez from their crossing point. In the next 27 hours the Israelis occupied considerably more territory eastward in the direction of the canal but made very little progress to the south toward Suez. It is likely that the Israelis were slowed by their taking the time to destroy SAM and AAA sites in the area. The final encirclement of Suez, the taking of 'Adabiyah farther south, and the cutting off of the 3rd Army all occurred on the afternoon and night of 23-24 October. It is a fair guess, based on the speed of their moves and the fighting that continued after the second cease-fire, that the Israelis were far from secure in their position even when the second cease-fire took effect at 0700 local time on 24 October and that they made considerable force changes and redeployments to tidy up their positions after the cease-fire. By midday on 25 October the Israeli operation was complete. [redacted] the Israelis ensconced in an arc stretching from the Gulf of Suez at 'Adabiyah to the Suez Canal just south of Ismailia.

It had taken the Israelis about eight and one-half days to cover the approximately 110-kilometer perimeter of their enclave. This translates into a rate of advance of approximately 13 kilometers a day. While this may not have been trench warfare, neither was it blitzkrieg. Certainly it was a lot slower than the 1967 war, when the Israelis covered 160 to 175 kilometers in less than five days.

Many things combined to slow Israeli progress in the early stages of the crossing. First, the Israeli political and top military leadership was cautious, especially for the first few days of the operation. While the Israeli crossing offered the possibility of turning the tables on the Egyptians, perhaps catastrophically, it also held the possibil-

ity, if it failed, of turning into a disaster for Israel. The battle at the Chinese Farm and continued Egyptian attempts to choke off the corridor to the crossing site could only have reinforced Israeli caution.

Secondly, the Egyptian mechanized brigade located opposite the Israeli crossing point represented a force that had to be dealt with before the Israelis could safely proceed. It appears that the Israelis held up any significant movements to the south until that brigade had been eliminated during the 17th.

Finally--and, on this point we have little direct evidence--it appears that the scattered Egyptian forces in the area put up firm resistance. While these forces were unable to halt the Israelis, they certainly slowed them and forced the Israelis to proceed perhaps more cautiously than they might have otherwise. [redacted] By the last day or two of the war, however, the Israelis apparently had the ability to move quickly and did so by bypassing many Egyptian units. Many of the cease-fire violations in the few days following the end of the war probably arose from Israeli attempts to eliminate bypassed pockets of Egyptian troops.

Combat Highlights

Strategy

The contrast between the Syrian and Egyptian strategies was striking. The Syrians attempted to liberate the whole of the Golan at a stroke; the Egyptians attempted a very limited operation. The Syrians attempted to resolve their problem militarily; the Egyptians viewed their military operation as a complement and prod to the political/diplomatic process of regaining the Sinai. The Syrians attacked with their armor in front in an attempt to wage an aggressive war of movement; the Egyptians attacked with their infantry in front with the specific aim of going to the defensive immediately after the initial penetration.

The campaigns of the two Arab combatants had certain features in common, however. Most significant, both Egypt and Syria committed virtually their entire ground force to the forward area. This left both armies vulnerable to a concentrated counterattack from the Israelis. On both fronts, when the Israeli attack pierced the crust of the Arab line, neither Arab state had sufficient reserves available to meet the Israelis. Both Egypt and Syria had apparently devoted considerable effort to planning and training for the initial stages of their attacks. After the opening phases of the war, however, both Arab armies exhibited the defects of command, control, training, and maintenance which US intelligence had estimated were present. In the final analysis, the Egyptian and Syrian armies showed they could be trained to win a battle but had yet to master the skills needed to win a war against the Israelis.

As for the Israelis, their 1973 strategy exhibited a surprising measure of stagnation because of, or despite, 1967 experiences. For one thing, in the ini-

tial days of the Sinai campaign the Israeli armored forces were hurt badly in an attempt to apply a doctrine that had been used successfully in 1967--the use of unsupported tanks against infantry. For another, the Israeli higher political and military leadership evidently lost sight of the crucial importance of time for Israeli war planning. In 1956 and 1967 the Israeli military was acutely aware that success had to be achieved within a very few days before outside powers could intervene to Israel's detriment. In 1973 the Israelis appear to have operated under the impression that, because the other side started the war, they could pursue the war relatively free of time constraints imposed from without. The Israelis failed to allow adequately for the probability that, once the war had turned against the Arabs, both the Arabs and the Russians would bring pressure to bear to obtain a cease-fire to minimize Israeli gains and protect the greatest possible advantage for the Arabs. The desire to minimize casualties and end the war quickly--considerations of a military character--operated to impose a sense of urgency among field commanders and, presumably, many others at higher civilian and military levels. The available evidence, however, fails to indicate the heavy, omnipresent sense of time that pervaded the 1956 and 1967 campaigns.

Further, the Israeli leaderhip appears to have neglected to draw the implications of its decision on 5 October, and again in the very early hours of 6 October, not to preempt. If the Israelis were certain enough of a war to consider preemption, why then was the situation not serious enough to order general mobilization? To a considerable extent the answer probably lies in their misperception of the benefit accruing to them from the occupied territory. Their leadership operated on the assumption that, in the event of an Egyptian attack, Israel could trade space for the time necessary to mobilize. Prime Minister Meir turned down Chief of Staff Elazar's pleas for mobilization because she had committed Israel to avoid the appearance of provocation. Perhaps more fundamentally, she and her cabinet were

inhibited because if Israel mobilized before an Egyptian attack it would appear to be an admission that the Sinai, the Bar Lev Line, and all the money and casualties the Israelis had spent holding the bank of the canal had been wasted.* The rationalization for keeping the Sinai was that occupying it made it unnecessary for the Israelis to mobilize until an attack came.

Because of the inhospitable climate the Egyptians had never based large forces permanently in the Sinai. The movement of large numbers of troops across the canal had been one of the principal precipitating acts of the 1967 war. By occupying the canal bank, the Israelis had deprived themselves of this indicator and were forced to rely for strategic warning on their intelligence appraisal of Egyptian intent. To a large extent, loss of the canal-crossing indicator nullified the military and political value of the strategic depth of the Sinai by allowing the Egyptian forces to close with the Israeli forces with virtually no warning. This ensured that the Israelis fought the first major battles in a new war at the end of long lines of supply and communications. Egyptian security deprived the Israelis of reliable intelligence as to the Egyptian intent.

The same considerations did not apply with such force on the Syrian front because the Israeli-held Golan was only a little over 60 kilometers long by 25 kilometers wide, at most, and close to Israeli population centers. Hence, the Israelis did take the precaution of moving an armor brigade to reinforce this front several days before the war. Once it started, however, the proximity of Syria forced the Israelis to give first priority to stabilizing the Syrian front, thus giving the Egyptians time to consolidate their hold on the Sinai. In the final analysis the strategy followed by the Israelis since 1967 of maintaining the Bar Lev Line made it virtually impossible for Israel to hold the east bank in the October war.

* Several accounts of the political/military interactions among the higher Israeli leadership exist. They differ on detail but agree overall with this interpretation.

Air Defense

In the air defense area the Egyptian and Syrian systems had a good deal in common. Both systems were equipped almost exclusively by the USSR, which had also supplied virtually all the training and advice necessary to establish them. The Soviet air defense involvement began in the early 1960s in Egypt, but not until after 1967 in Syria. Since 1971 the Soviets' level of support, evidenced by their willingness to export relatively modern equipment, had increased greatly. As a result the Syrian and Egyptian air defense systems probably were the most diversified and concentrated anywhere in the world. Diversification is an important factor, because it vastly complicates the countermeasures problem for an attacker.

Despite the similarities, the differences were more telling during the war. The Egyptians deployed their SAMs in the combat area to cover about 3,700 square nm while the Syrians were covering only about 1,800. Though the density of deployment was only slightly higher in Syria, the location of the most significant targets in a small defended area made it easier for the Syrians to anticipate IAF attacks. The Golan, however, offered many routes by which attacking aircraft could avoid detection by approaching targets through valleys and in the shadow of mountains. By contrast, the relatively flat terrain along the canal provided little cover for attacking aircraft.

Each Arab system shot down 51 aircraft even though the Israelis flew three times as many sorties against the Egyptians. Israel's daily loss rate was almost always higher on the Syrian front than on the Egyptian because of the different tactical situations. The Israeli Air Force had no choice but to fly over the most heavily defended parts of Syria if it was to play any part in stopping the Syrian penetration or aiding the Israeli counterattack. Over the Suez Canal area the situation stabilized more quickly, the action was farther from Israel proper, Egyptian forces were more widely deployed, and there were areas where the air defense system was thin. So

the Israelis could exercise a certain amount of choice in risk taking.

The Arab air defense systems were designed to compensate for the poor quality of Arab fighter pilots by maximizing the use of ground-based technology. The Israeli situation was just the opposite. The quality of Israeli pilots was so much higher than that of the Arabs, the Israelis devoted virtually all their Mirage aircraft--15 to 20 percent of their total air force--to counter air operations. Israel succeeded in achieving a kill ratio of some 56 to 1 in air-to-air combat. The majority of the 500 or more Arab aircraft (including helicopters) destroyed in 1973 were destroyed as a direct result of aerial combat.

It is easy to measure the number of aircraft an air defense system shoots down and to calculate loss rates, but the purpose of such a system is not to shoot down airplanes. Its purpose is to protect a friendly force on the ground against damage inflicted by a hostile air force. Shooting down enemy aircraft is merely a means to that end. While direct evidence is scarce, it appears that the Arab air defense systems achieved their greatest success in preventing the IAF from inflicting as much damage on the Arab forces in 1973 as it had in 1967. At a minimum the Israelis were forced to forgo certain weapons and delivery techniques to minimize exposure to the Arab systems. The Arab systems kept the IAF from loitering over the battlefield, precluding its use as flying artillery. The loss of this capability seriously degraded the IAF's effectiveness.

Performance of the Forces

Many observers, including Israelis, were surprised by the stiff defense put up by the Arab armies in 1973 and by the apparent improvement in their level of competence. An accurate and balanced appreciation of the differences in the performance of the troops in the field between 1967 and 1973 depends upon putting the 1967 war in perspective.

The experience of the 1967 war created a false impression of the willingness of Arab troops to stand and fight. Because the war lasted only six days, the impression took root that the Arabs fled at the mere approach of the Israelis. Ever since, Israeli propagandists and psychological warfare experts have fostered that belief--too successfully. Not only did they convince many in the Arab countries, but also many in Israel. A good deal of the stagnation in Israeli armor tactics probably had its roots in the complacency abetted by Israeli-created attitudes. The reason for the Israeli campaign was straightforward--if one could convince the Arab soldier that he was hopelessly inferior to any Israeli soldier, the ordinary Arab soldier would not be inclined to risk much in combat. The Israelis were psychologically unprepared for the steadfastness of the Syrians under fire or for the willingness of Egyptian infantrymen to stand up to Israeli armor. Thus, 1967 tactics were attempted in 1973 with very costly results.

A distinction can be drawn between the willingness of soldiers to use their rifles, machine guns, or antitank weapons and the competence of troops to stand their ground under unexpected or rapidly changing circumstances. In 1967 the Arab collapse in the Sinai was brought about because the Israelis relied on mobility to carry them into the flanks and rear of fixed Egyptian defensive positions. The Egyptian soldier had not been trained sufficiently to cope with such attacks. The Syrians folded on the Golan in 1967 because their government bungled an attempt to force the UN to call a hasty cease-fire by proclaiming the fall of Al Qunaytirah some eight to twelve hours before it fell in fact. The Syrian soldier, like his Egyptian counterpart, could not cope with a fluid battlefield. However, when the Israelis were unable to use their mobility to upset the Arabs' carefully wrought defensive plans, they found the Egyptians and Syrians very tough fighters--as the 1967 battles at Garadi in the Sinai and Tall Fakhr on the Golan will testify.

The greatest weakness of the Arab armies has always been the officer corps. Through the 1967 war,

this flaw could be largely ascribed to class differences, deficient education, and a consequent set of attitudes on the part of officers which denigrated the ordinary soldier. As a result, there was little real contact between soldier and officer, less understanding, and virtually no trust. One of the major strengths of the Israeli Army, in contrast, has been the close relationship between men and officers--a relationship so close that, in the eyes of some foreign observers, it borders on the insubordinate. During the period between 1967 and 1973, both Egypt and Syria took steps to eliminate the worst officers of the old pattern and to recruit and keep younger, better educated officers and NCOs whose competence and more open attitudes enabled them to be more effective leaders. The relative gap, in this respect, between Arab and Israeli armies probably narrowed somewhat.

Still, certain weaknesses of the Arab officer corps were evident in 1973. This was especially so after the carefully planned and rehearsed opening phases of the war ended. On both fronts, plans were rigidly adhered to long after it was clear that they were no longer profitable. On the Syrian front this was manifested in the mindless march of the Syrian 7th Infantry and 3rd Armored Divisions and the Assad Brigade into the dead end of the Vale of Tears. In the Sinai, the Egyptians crossed the canal and dug in according to their plan. In so doing they forfeited the chance to improve on their plan.

On the Sinai front, command and control problems once again bedeviled the Egyptian Army. It appears to have taken the Egyptian high command several days to grasp the magnitude of the Israeli force which crossed the canal. The Egyptians never did manage to bring any major force to bear on it, but simply tried to block the roads leading from the canal area to Cairo. After the war the Egyptian 3rd Army made one or two desultory attempts to break its encirclement, but these never amounted to a serious challenge to Israeli control.

The greatest mistake of the Arab armies in 1973, as in 1967, was their failure to train their troops

adequately. The soldiers themselves seemed willing enough to do what they had been trained for, but often their training was rigid or poor. For instance, both the Syrian and Egyptian armored forces used their tanks in rigid, stereotyped ways that crippled their own effectiveness and made them relatively easy targets for the Israelis. Perhaps the Arabs are constrained by the inadequate capabilities of most of their recruits. The limited nature of the Egyptian plans seems to indicate this.

The Israeli Army once again showed that its superiority over the Arab armies was greatest in the quality of the training and initiative of the lower ranks--individual soldiers, NCOs, and platoon- and company-grade officers. In the first days of the war it was the tenacity and adaptability of small units and their immediate leaders that enabled the Israelis to stabilize the front and go over to the offensive so quickly. This was especially evident on the Golan, where Israeli forces, though outnumbered five or six to one in almost every category of equipment, were able to stop the Syrian advance within 24 hours and eliminate it within 72 hours.

In terms of artillery, the Israelis were severely slighted not only in terms of equipment, but also in terms of trained spotters and forward observers. Artillery liaison officers with forward units did not have enough materiel and working space to direct proper artillery support for these units. Some artillery units had to go to war without adequate spare parts, and some found their equipment so scattered that it took several days to gather it together. As one consequence the divisions of Generals Adan and Sharon arrived at the Suez Canal on 7 and 8 October without artillery. Lack of artillery support on 9 October probably compounded the severity of the repulse the Israelis suffered on that day.

In another instance, the Israeli mechanized infantry--those assigned to accompany armored units in half-tracks or APCs--had been trained by the Armor Corps in anticipation of the use of 1967-style tactics. When it developed that those tactics could not be used and the mechanized infantry had to fight on foot, their

training was deficient. As a result, the Israelis suffered greater casualties than they might have.

Despite all the problems, however, the Israelis once again proved the importance of flexibility in maintaining their superiority. The most striking example of this is provided by the Israeli response to the Arab--particularly Egyptian--antitank weapons. By 8 October the Israelis had recognized the flaws in their armor tactics and adopted a defensive procedure under which they waited for the Arab armor to attack and then took the Arabs under fire from extreme range. This made it difficult for the Arabs to bring their antitank weapons forward. This change of tactics by the Israelis took maximum advantage of the longer range of most of their tank guns and the superiority of their long-range tank gunnery.

The Israeli attack on 8 October appears to have been the last attempt to use tanks in the unsupported 1967 style and even then the Israelis may have been drawn in by their initial success. Within four or five days after the beginning of the war, the Israelis were adopting tactics which reduced the threat from Arab antitank weapons to manageable proportions. This adjustment in the midst of combat provides a fair measure of the flexibility of Israeli leadership and the thoroughness of low-level training.

Tank Versus Antitank

The effectivenes of the Sagger and RPG-7 was described in almost mythical proportions in the immediate aftermath of the 1973 war. The evidence now available supports a much more realistic appraisal. Antitank weapons like the Sagger and RPG-7 took a heavy toll of Israeli armor. But they did not render the tank obsolete. The initial impression created by the Egyptian use of antitank missiles was artificially reinforced by the inappropriate tactics used by the Israelis in the first few days of the war. It is probably safe to say that no large, modern army will again make the mistake of using unsupported tanks against massed infantry.

The Israelis state that they did not use the French-built SS-11 antitank wire-guided missiles in their possession before the war broke out. It appears the SS-11 had been phased out of the Israeli inventory before the war. We have no reasonable explanation why. The TOW missiles arrived from the US too late to be used during the war proper, but did see some action during the cease-fire violations that persisted for some weeks after 24 October. The shoulder-fired LAW--the US answer to the RPG-7--was used some. It was effective, but too light and short ranged to satisfy the Israelis.

The Israelis rediscovered some ancient priciples in seeking a response to the antitank weapon threat posed at the beginning of the October war. Foremost, the Israelis found that no single weapon can long dominate the battlefield. Victory requires the use of a balanced force with many complementary offensive and defensive elements. The battlefield, in short, is a complicated environment and no one weapon or arm of service can function effectively on it without the active aid and cooperation of others. This is reassuring for the Israelis, since the effective and flexible use of mobile forces under difficult circumstances is precisely the area in which they hold the greatest comparative advantage over the Arabs.

Mobilization

The mainstay of Israeli military strength has always been the ability to mobilize rapidly. The population is too small and the economy too industrialized to permit Israel to have a large standing army. It is much more economical to maintain a small, highly trained cadre of regular forces together with a larger number of draftees on active duty. These are supplemented by a number of reservists who are required to serve as much as a month each year on active duty. The net result is that Israel has a large number of people with a high level of military skill for a relatively low cost. Rapid mobilization, however, is what makes it possible for Israel to use this scheme. As a result the Israelis have always in the

past taken great care to see to it that the necessary maintenance and notification systems worked to support a fast mobilization.

Superficially, these systems broke down in 1973. Stories are rife about the poor state of maintenance found to exist in much Israeli equipment at the time. In any case, necessary supplies reportedly were missing when mobilization occurred, causing delays while misplaced equipment was rounded up. In several instances the binoculars had disappeared from tank units--allegedly appropriated by status-seeking infantry. In another case antitank missiles could not be located. Also, records were said to have been neglected, causing the alerting system to malfunction frequently. Almost certainly there is some truth to all these stories, and many shortages and inconveniences are known to have been encountered.

What matters most, however, is how much combat power was delivered to the fronts in how much time. By that bare criterion the Israeli mobilization system worked very well indeed. Three armored divisions were delivered to the Golan Heights in less than 72 hours, mostly within 48. In the Sinai the major part of two armored divisions arrived along the canal within 24 to 36 hours. The first reserve units were in action on both fronts within 12 hours. One could hardly improve. The cause of the Israelis' frustration is that, having been surprised, they could not with any amount of speed repair the damage done by their failure to begin mobilization promptly when significant evidence indicated the imminence of war.

major items of bridging equipment being brought to the canal for the first time, as well as greatly increased artillery strengths on both fronts.

The fact that the major part of the mobilization took place after the war began caused all the normal problems to become larger and harder to deal with. The overriding necessity then was to get troops to the fronts as fast as humanly possible. In the north, that meant sending tanks forward individually without

waiting to organize units. Individual tanks were put into service as soon as a complete tank crew was made up. Tanks on their way to the Golan were packaged into units via radio as they drove along. The situation was only relatively better in the Sinai, but even there both Generals Adan and Sharon moved into battle without their organizational artillery because equipment transporters were lacking and because maintenance flaws were found. For the first several days things were a tangled mess as units went to war in tanks they had never seen with crewmates they had never met. Troops were formed into units under commanders they had never heard of. [redacted] the situation in the rear areas and at major headquarters was chaotic.

The mobilization worked for two reasons. First, the level of training among Israeli reserve troops was sufficient to cope, and the qualities of those troops and the situations in which they found themselves were complementary--the times demanded flexibility, adaptability, and high motivation, and these assets the Israeli troops had. Second, whether the Israeli mobilization planners foresaw a situation such as the one they found on 6 October 1973, we do not know. Nevertheless, the Israeli stress on standardization of equipment layout and loadings operated well enough to enable any Centurion crewman, for instance, to operate with any Centurion tank.

Navy

The naval aspects of the October war have not been discussed up to now in this study because they are well treated in at least two excellent published reports.* The subject is introduced here because the Israeli naval experience reinforces a point made

[redacted]

earlier. While the Israeli Army had failed to tailor its strengths to Arab weaknesses, the navy had done so in painstaking detail. The Egyptian sinking of the Israeli destroyer Elath in September 1967 had a traumatic effect on the Israeli Navy. At the time, Israel had two destroyers and 11 patrol boats, none of them missile equipped. The Egyptians had about 12 Komar missile patrol boats and about six destroyers. Israel quickly decided that ships as large as a destroyer had no chance against the Komars, and so the acquisition of a suitable counter--small, fast missile boats--was accelerated.

The result was the Saar class of fast patrol boat armed with an Israeli-developed antiship missile. The combination of the two systems represents one of the clearest cases of Israel's tailoring its forces to those of the Arabs. Israel was unable to develop a missile with a range more than half that of the Styx missile mounted on the Komars, so the Saars developed tactics designed to ensure their ability to get close to the Komars--and to the larger Osa boats received by the Arabs after the 1967 war.

These tactics were essentially quite simple. Each boat was equipped with a receiver capable of detecting the Styx search radar so the Israelis would know when the Egyptians had detected them. The boat's own radar was used to track the Styx missile, which was similar to a remotely piloted aircraft. When the missile came within 10 to 15 kilometers, the Israelis launched chaff-dispensing rockets across its path and headed toward the missile at maximum speed. Since the Styx is a homing missile, if its tracker could be diverted even momentarily by the chaff, the missile might be unable to reacquire a real target in time to hit it. Also, since the Styx homed on the radar return from the target, by heading toward the missile the Israeli boat would be presenting a minimum target to the missile. To reduce radar return even further, a radar-absorbing coating was applied to the forward part of each Saar's superstructure. As final defensive measures the Israelis used a shorter ranged chaff dispenser fired slightly off to the side of the boat to draw the missile off course and automatic

cannon and antiaircraft guns to shoot at the missile itself.

The Israelis received a lot of help from the Egyptians and Syrians in making their tactics work. First, the Arabs were very "noisy" about keeping their radars on and chattering on their radios, making it easy for the Israelis to locate them. Secondly, the Arabs launched their missiles at maximum range--24 nm--giving the Israelis maximum time to detect and deflect the incoming missiles. Finally, the Arabs were remarkably unaggressive. Typically they would fire their missiles on first detecting the Israelis and then flee for their harbors.

The Arab losses included eight missile boats, a minesweeper, a landing craft, and two patrol boats. The Israeli losses were nil, with slight damage to one Saar. The Arabs achieved no hits by the 50 or so missiles they fired--a marked change from the three hits scored by four Styx missiles fired at the Elath and from the eight hits out of nine Styx missiles fired in the Indo-Pakistani war. The difference is accounted for by the Israeli countermeasures and tactics as well as the maneuverability of the Saar. The outcome of the naval battle had little or no impact on the outcome of the war as a whole, but it provided a clear lesson to both Arabs and Israelis: tailor one's own strengths to take maximum advantage of the other side's weaknesses--complacency carries a heavy price.

Electronic Warfare

There is no indication that EW had a major impact on the war despite the occurrence of several incidents seeming to show the potential of this brand of warfare. Early in the war Israeli Major General Mendler, commander of the Armored Force Sinai, was killed in an Egyptian artillery barrage. There is some evidence to suggest that the barrage was fired in response to intercepted communications which pinpointed Mendler's position. The Israelis had sufficient depth in personnel and resilience in the com-

mand and control structure to absorb this loss with minimal disruption, but there could be circumstances when such a loss could do great damage. Israeli communications security was lax in 1973 for two main reasons--the pressing emergency of the situation and the lack of secure voice communications gear. Much Israeli communication at the tactical level was via radio and almost entirely in the clear. The Arabs, particularly the Egyptians, made a great effort to intercept such communications and showed a considerable ability to redirect artillery fire in response to intercepted radio chatter.

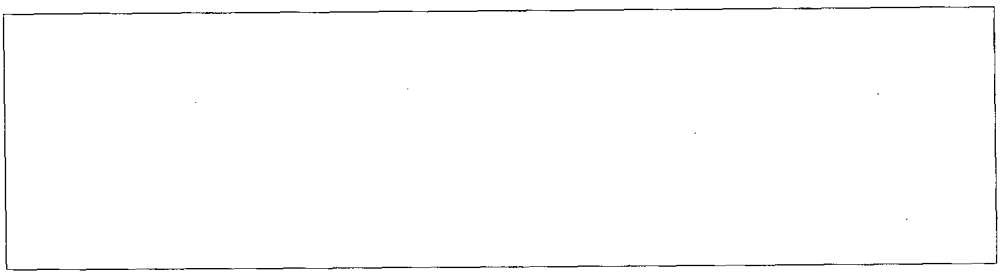
A blunder on the part of the Egyptians, however, offers the best example of EW applied to tactical combat situations. On the afternoon of 16 October the 25th Armored Brigade of the Egyptian 3rd Army was ordered to move north along the shore of the Great Bitter Lake early on the 17th. The purpose of the move was to help pinch off the corridor to the Israeli crossing site. [redacted] The trap was sprung and virtually the entire brigade, including all 60 of its tanks, was destroyed within 15 minutes. The Israelis claim to have suffered no losses in this engagement. Before the war the Egyptians had made maximum use of landlines to prevent Israeli interception of their sensitive communications traffic. Once the war began, however, the Egyptians were forced to use radio, and their security was often poor.

On the Golan front, the Syrians took advantage of the Israeli laxity in radio communications security by directing their artillery at unit headquarters which were located by radio direction finding. The Israelis, however, responded in kind, and neither side gained any decisive or dramatic advantages through exploitation of the other's communications.

The Arab SA-2 and SA-3 systems were thought to pose only a small threat to the Israelis because electronic countermeasures directed at them had been developed over a period of years. The SA-6 and SA-7,

however, were quite different, and the Israelis did not have ECM against them. Moreover, the air defense systems of the Arabs were deployed more thickly than any other system known. The Israelis used electronic measures heavily in an effort to hold down their losses. The drama of the war's outbreak and the maiden combat of the SA-6 focused attention on EW in a way that was unprecedented as far as the Middle East went. But, as in the naval aspects of the war, EW made no major difference in the outcome of the war as a whole. EW tactics and techniques are well covered in other reports* and will be covered in detail in forthcoming reports.

On the basis of very sketchy reporting, it appears that the Israelis had again become complacent about Arab developments in the field of EW and were, as a result, surprised both at the extent and competence with which the Arabs used both passive and active techniques. That much said, it appears that the Israelis retained a wide measure of superiority in their use of highly refined electronic techniques both to counter Arab air defense weapons and to collect and exploit intelligence. In this new and still largely unexplored form of warfare, however, Israel's performance in 1973 does not leave it with the same relative advantage still evident in other forms of warfare.



Bibliographical Note

The sources used in the preparation of this report are too numerous to list. The following represent only the most important and productive sources discovered in the period January 1974 through May 1975.

Three Israeli books are indispensable to understanding Israeli policy, intelligence perceptions, and popular thinking just before and during the war. They are *Kippur* by Y. Ben Porat and six other Israeli journalists who covered the war both at rear headquarters and in combat. The second is *October Earthquake* by Ze'ev Schiff, an Israeli military writer and historian. Written by a member of the Israeli "establishment" in late 1974, it is a more balanced, analytical account which focuses more on the problems of intelligence and strategy than does *Kippur*. Finally, Chaim Herzog's book *The War of Atonement* is probably the best tactical summary. Herzog is a former Chief of Military Intelligence, is a military historian, and was the principal government military commentator during the 1973 war.

On the Arab side, lamentably little literature has been translated into English. The only such book available at this writing is *The October War* by R. N. El Rayyes and D. Nahas, published by En Nahar Press Service of Beirut in 1973. It reprints the official Egyptian and Syrian communiques and contains a rather brief account from the Arab point of view. Nevertheless, it contains some interesting material and does make an effort to avoid bombast. The *Journal of Palestine Studies*, a quarterly published in the US, contains in numbers 10 and 11, January and March 1974, interesting interviews with Arab leaders and articles on Arab strategy before and after the war. The bibliographic notes section of the *Journal* always contains references to military articles and books written in Arabic, most of which have never been translated. For anyone with the linguistic resources, many leads could be developed there.

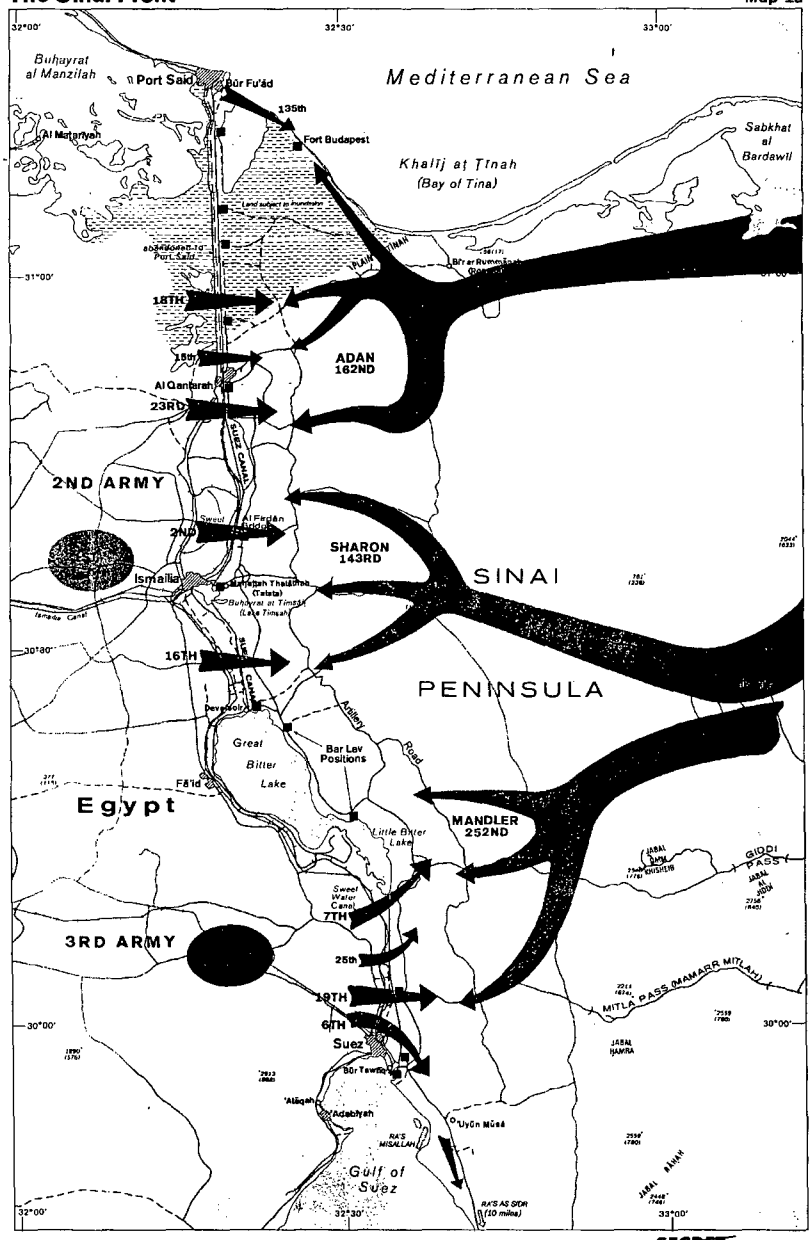
Approved for Release: 2012/09/04

Approved for Release: 2012/09/04

SECRET

The Sinai Front

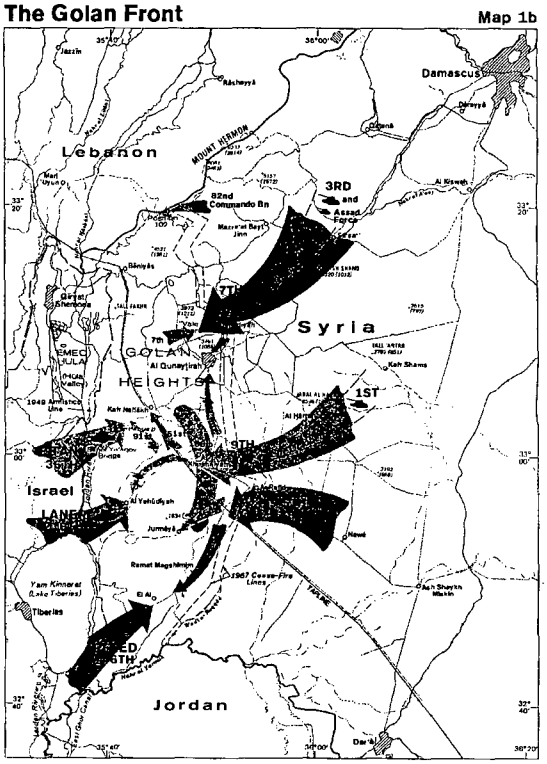
Map 1a



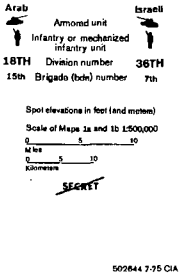
SECRET

The Golan Front

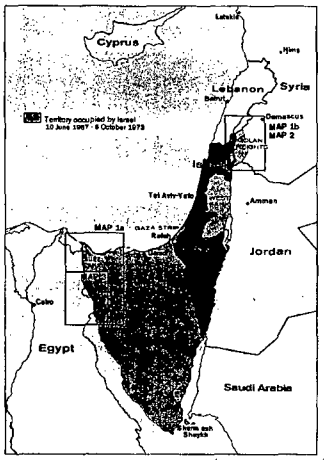
Map 1b



Arab-Israeli War
Initial Arab Attacks
6-9 October 1973

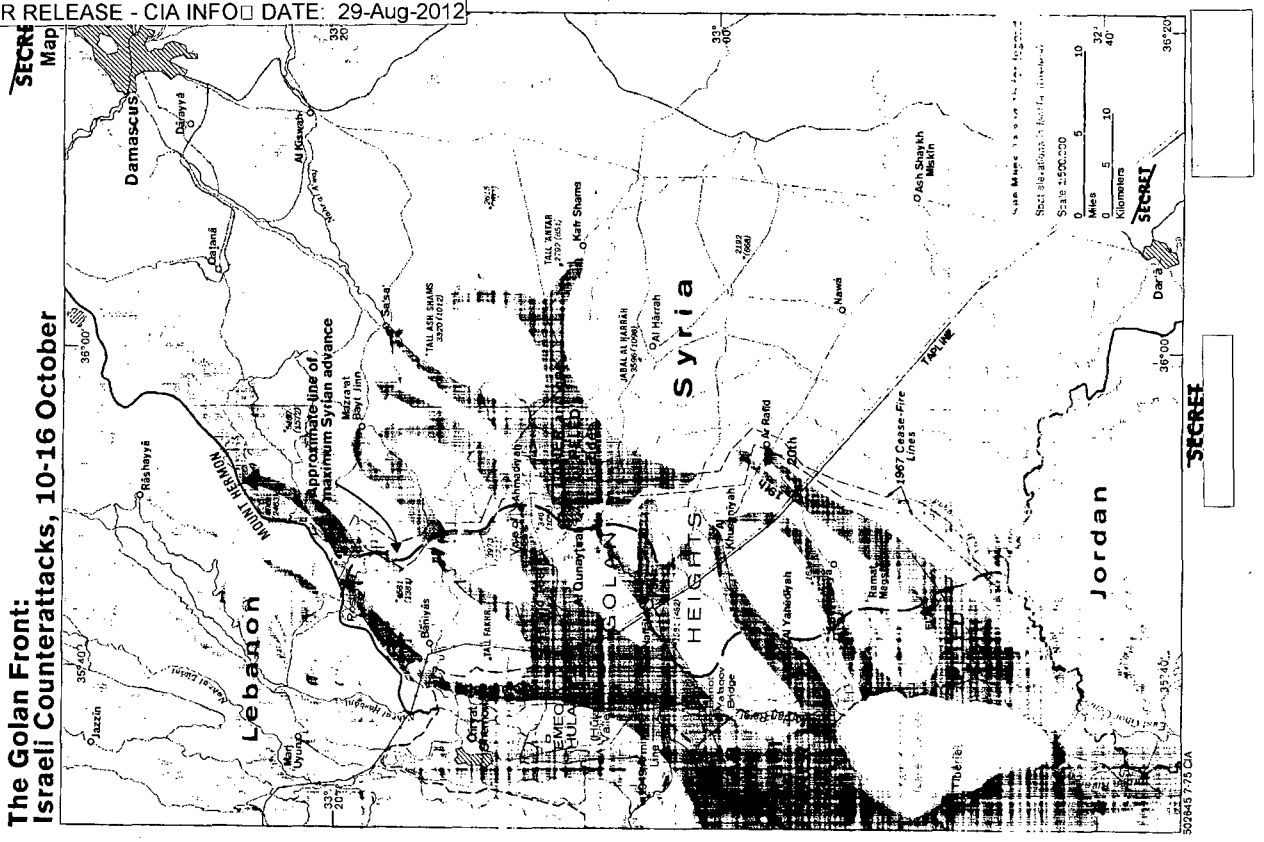


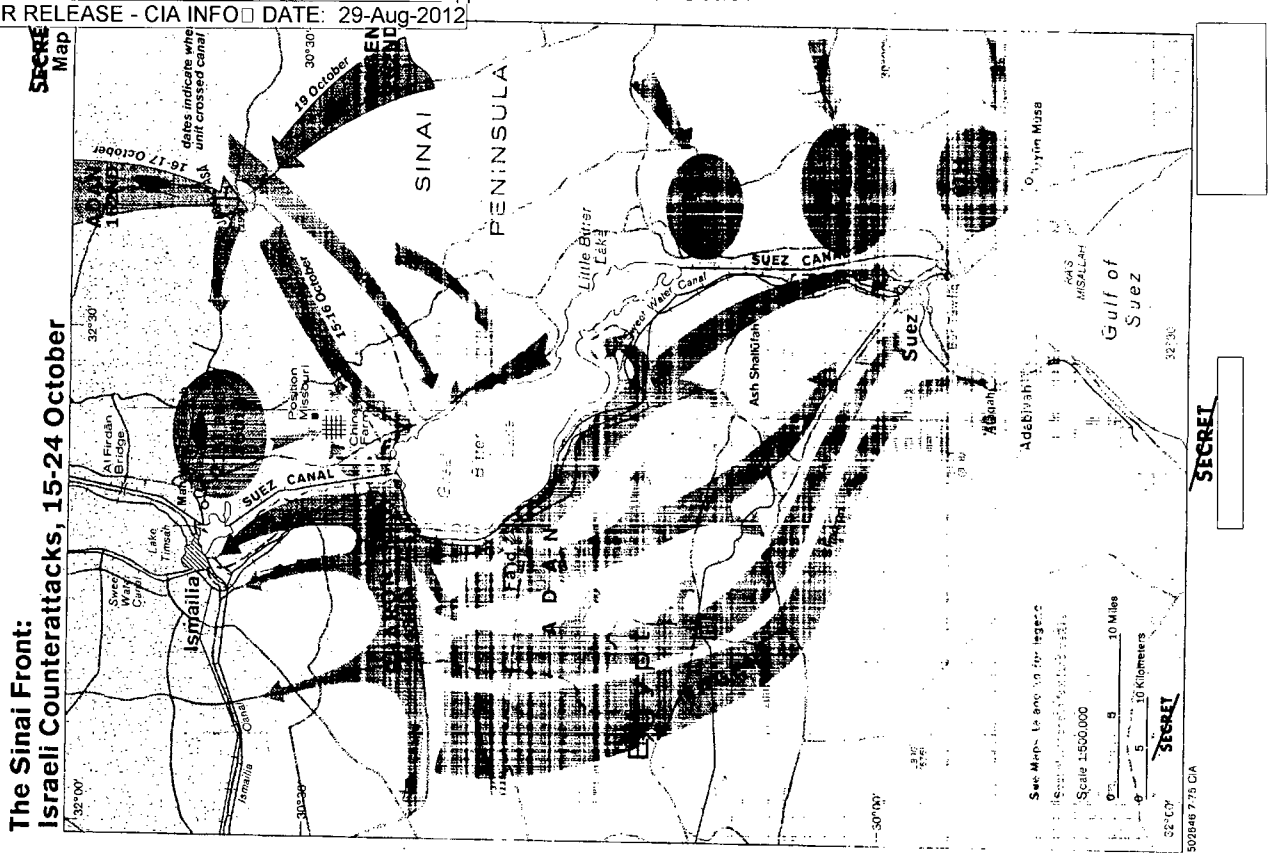
SECRET



502644 7-95 CIA

SECRET





Secret

Secret