



54 Comparative Analysis: Arab and Israeli
Combat Performance 1967 and 1973 Wars
(1976)

COMPARATIVE ANALYSIS
ARAB AND ISRAELI COMBAT PERFORMANCE
1967 AND 1973 WARS

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HISTORICAL EVALUATION AND RESEARCH ORGANIZATION

ERRATA

Comparative Analysis Arab and Israeli Combat Performance 1967 and 1973 Wars

<u>Page</u>	<u>Figure</u>	<u>Change</u>
7	2	Column 7 heading from 1/12 Div to read 1/8 Div 1/36 Bde 1/24 Bde
9	6	Eng. No. 67-2 should read Abu Ageila-Um Katef
10	8	June 8, columns 3 and 4 should read 10.1(100) and 10.1(4) respectively
10	9	June 5 line should read across: 28, 78, (1)18, 1(46), (10), (32), ..., ..., ..
23	33	For engagements 22, 23, 24, change Arab CEV column to read down: 1.70, 0.73, 0.26
23	33	For engagements 22, 23, 24, change Israeli CEV column to read down: 0.59, 1.36, 3.85
24	35	For 1967 - West Bank (far left column) change Israeli CEV to 1.95 (far right column)
26	last para.	Change first line to read: In 1970, following an equally dismal performance against Jordan, there had been one more coup d'etat, led this time by the then Minister of War, Air Force General Hafez al Assad.

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COMPARATIVE ANALYSIS, ARAB AND ISRAELI COMBAT PERFORMANCE
1967 AND 1973 WARS

A HERO Report

INTRODUCTION

OBJECTIVE

The purpose of this study by the Historical Evaluation and Research Organization (HERO), was stated in the Task Order to be as follows:

Utilizing data already available to HERO, with such additions and refinements as are mutually agreed by HERO and OASD(I) to be necessary and feasible within budgetary limits of the study, HERO will analyze approximately ten engagements, each, at brigade level or higher, for the 1967 Six Day War, and the 1973 October War, employing both the Quantified Judgment Method of Analysis of Historical Combat Data (QJMA) and qualitative historical analytical techniques, in order to ascertain the following:

- a. Relative combat effectiveness of the opposed forces in each engagement;
- b. Patterns or differences in relative combat effectiveness of different Arab units and armies;
- c. Patterns or differences between relative Arab-Israeli combat performance in 1967 and in 1973;
- d. The extent to which Arab and Israeli relative performance changed between offensive and defensive postures;
- e. The extent to which the presence or lack of airpower appears to have influenced combat outcomes;
- f. The extent to which outcomes were influenced by any other variables of combat.

The tasks to be performed and the procedures to be followed, according to the Task Order, were:

1. Compilation of data; to include such additions or refinements of existing HERO data as may be necessary, assuring compatibility, to the extent possible, with data used in ongoing analyses of the Middle East Balance;
2. Quantitative analysis of the 1967 War data by QJM;
3. Qualitative analysis of 1967 War data;
4. Quantitative analysis of 1973 War data by QJM;
5. Qualitative analysis of 1973 War data;
6. Comparative evaluation of results of steps 2-5, inclusive;
7. Preparation of Report.

DATA SOURCES

In the performance of Step 1, data on the 1973 war already available to HERO was reviewed and refined on the basis of information collected for a report on "The Middle East War in Historical Perspective," prepared for the Director of Net Assessment, Department of Defense, and additional information received in conversations with Major General Avraham Adan, Israeli Army, and Colonel Avraham Ayalon, Israeli Army.

Data on the 1967 War is that compiled in an unpublished operational narrative of that war prepared by Colonel T.N. Dupuy, USA, Ret., with assistance of members of the HERO staff, which has been reviewed and commented on by military officials of the Israeli, Egyptian and Jordanian armed forces.

A cursory check of some items of classified data on the October War led to a conclusion that the HERO unclassified data is probably just as accurate; thus no classified data was used in the study, and accordingly this report is not classified.

PARTICIPANTS

Most of the work on this study and this report was done by Colonel T.N. Dupuy, USA, Ret., and Colonel John A.C. Andrews, USAF, Ret. Contributions to the study were also made by Grace P. Hayes and Vivian Lyons, of the HERO staff. The undersigned takes full responsibility for the results of the study and this report.

Dunn Loring, Virginia
15 June 1976

T.N. Dupuy
Executive Director

COMBAT PERFORMANCES IN THE 1967 WAR

THE DATA

Figure 1 is a summary of major statistical data of the 1967 "Six Day War," including overall strengths and losses of personnel and selected major items of equipment for all major participants. Figures 2, 3, 4, and 5 present more detailed listings of the principal varieties of weapons and combat equipment estimated to be on hand in the Israeli, Egyptian, Jordanian and Syrian armies as of 1 June 1967, showing presumed allocations to major combat formations, such as divisions and brigades.

Figure 6 is a listing of all major engagements on all three fronts, between June 5 and June 10. Figure 7 is an estimated breakdown of the presumed total Israeli and Egyptian casualties on the Sinai front, with allocations to days and engagements based upon professional historical and military judgment in consideration of the Dupuy detailed narrative of operations cited under "Data sources" in the Introduction to this report. Figure 8 is a comparable breakdown of presumed Israeli and Egyptian tank losses on the Sinai front, by day and by engagement. Figure 9 is a comparable breakdown of estimated direct air support allocations by the Israeli and Egyptian air forces, also related to engagements and dates.

Figures 10, 11, and 12 provide comparable data estimates for the Jordan, West Bank, Front, June 5-7, 1967. Figures 13, 14, and 15 provide comparable data estimates for the Syrian, Golan, Front, June 9-10, 1967.

Available resources of time and funds permitted analysis of only twelve engagements of the 1967 War—four on each front. This was a total of two more 1967 War engagement analyses than was provided for in the Task Order.

DATA ANALYSIS

Figure 16 is a sample engagement data sheet for Engagement 67-1, the Battle of Rafa, June 6, 1967. Figure 17 is a sample engagement calculation sheet for the engagement, showing the application of the data to the formulae of the Quantified Judgment Model (QJM). The entries for Figure 18, "Preliminary 1967 Arab-Israeli War Analysis," are derived from these and comparable data and calculation sheets for the other eleven engagements. That figure provides a summation of the QJM analyses of these engagements, and is the essence of this study's quantitative analysis of the 1967 War.

The columns of Figure 18 are described as follows:

1. Engagement number (see Figure 6)
2. Numerical manpower comparison (Arab with respect to Israeli)
3. Firepower comparison ratio
4. Relative Combat Power, basic calculation, in which all readily-identifiable combat variables have been considered;
5. The effects of surprise, reflecting effects of surprise on relative mobility and vulnerabilities of the opponents as calculated for World War II engagements.¹
6. Modified Combat Power Ratio (to reflect effects of surprise)
7. Engagement outcomes
8. Effective Combat Power Ratio; the ratio that would have been required for average ratio-result relationship in World War II engagement data base ($(R - R)/5 + 1$)
9. Arab Combat Effectiveness Value (CEV); calculated by dividing entry in column 8 by that in column 6.
10. Israeli CEV (reciprocal of Arab CEV)

¹See, T.N. Dupuy, The Quantified Judgment Method of Analysis of Historical Combat Data. HERO, Dunn Loring, Va., 1976.

During the process of analysis of the data in Figure 18, and that of Figure 34 (containing similar analytical data from 1973 War engagement analyses), three analytical hypotheses have been formulated:

1. Arab performance in situations and circumstances in which they were following carefully prepared pre-war plans was substantially better than when coping with unanticipated combat situations; this ability is estimated at about a 30% improvement over standard performance in pre-planned operations.²

2. The effects of surprise in 1967 and 1973 combat situations was clearly more significant than it had been in combat between the Germans and the Western Allies in 1943 and 1944; this increase appeared to be proportional to the greater average dispersion of troops in these wars (about 4,000 square meters per man) than in World War II (about 3,000 square meters per man). This enhanced value of surprise in an increasingly scientific-technical environment seems to be consistent with Soviet assessments, as represented by the following quotation from Scientific-Technical Progress and the Revolution in Military Affairs by Colonel General N.A. Lomov (Moscow, 1973):

Scientific-technical progress is the material basis of those revolutionary changes which have occurred in the Soviet Armed Forces in recent years. . . . /This/ revolution in military affairs to a significant degree has raised the importance of surprise. High combat readiness of the Soviet Armed Forces is caused by the most important of all the tasks confronting them—that is, to thwart the intentions and provide a decisive and complete defeat to any aggressor. The present capabilities of the Soviet Armed Forces make it possible to solve this problem.

3. The disruptive effects of surprise evidently continue for at least two days after the surprise is achieved. For the first day it is about two-thirds the disruptive effect of the surprise as calculated for the day it occurs, and about one-third the initial surprise disruptive effect on the second day after surprise is achieved.

The application of these hypotheses to the analytical results of Figure 18 provides somewhat refined values for combat effectiveness, as shown in Figure 19.

The refined analysis reflected by the values in Figure 19 shows remarkably consistent values in relative combat effectiveness of the opponents within each of the three sets of four engagements on the three separate fronts. It shows that the Israeli combat effectiveness superiority over the Egyptians was on the average 96%, or a CEV of 1.96; their superiority over the Jordanians was on the average 63%, or a CEV of 1.63; Israeli superiority over the Syrians was on the average 313%, or a CEV of 4.13.

Normalizing these relationships on the Syrian performance provides the following interesting comparison:

Israelis	4.13	(1.63)	(1.96)	
Jordanian	2.53	(1.00)	--	(1.20)
Egyptian	2.11	--	(1.00)	(1.00)
Syrian	1.00			

²This phenomenon has also been noted in World War II engagements between Russian and German forces, supporting a more general hypothesis: when a force of lower combat effectiveness is able to seize the initiative and operate in accordance with carefully prepared plans for either offense or defense, the combat effectiveness differential is reduced by one-third.

Figure 1. APPROXIMATE FORCE STRENGTHS, SIX-DAY WAR, 1967

Available	Israel	Total Arabs	Egypt	Jordan	Syria	Iraq
Mobilized Manpower	210,000	309,000	200,000	46,000	63,000	--
Tanks	1,000 ^a	2,337	1,300 ^d	287 ^f	750	--
APC	1,500 ^b	1,845	1,050	210	585	--
Artillery Pieces	203	962	575	72	315	--
SAM	50	160	160	0	0	--
AA Guns	550	2,050 ⁺	950	?	1,100	--
Combat Aircraft	286 ^c	682	431 ^e	18	127 ^g	106

^a200 M-48, 250 Centurions, 150 AMX-13, 400 Sherman-Super Sherman.

^bHalftracks.

^cIncludes 92 Mirage, 24 Super Mystere, 72 Mystere, 55 Ouragan, 24 light bombers.

^dIncludes 400 T-34, 450 T-54/55, 100 Su-100, 100 JS-3.

^eIncludes 55 Su-7, 163 MiG-21, 40 MiG-19, 100 MiG-15/17, 30 Tu-16, 43 Il-28; short of pilots.

^fIncludes 200 M-48, 80 Centurions.

^gIncludes 40 supersonic, 68 MiG-15/17, 15 Tu-16, 4 Il-28.

Figure 2. ESTIMATED ISRAELI ARMAMENT SUMMARIES, 1967

	Inf Bde	Meczd Bde	Armd Bde	Armd Rgt	Arty Rgt	1/12 Div 1/36 Bde Misc Units	9 Arty Rgts	2 Armd Rgts	14 Inf/Para Bde	2 Meczd Bde	8 Armd Bde	Totals
Personnel	4,300	4,300	3,600	2,000	1,000	25,000	9,000	4,000	60,200	8,600	28,800	135,600
Pistol	430	430	360	200	100	2,500	900	400	6,020	860	2,880	13,560
Rifle	3,870	3,870	3,240	1,800	900	22,500	8,100	3,600	54,180	7,740	25,920	122,040
Machine Gun, lt	120	80	40	30	10	250	270	60	1,680	160	320	2,740
Machine Gun, hvy	80	60	40	30	20	420	270	60	1,120	120	320	2,310
Mortar, 81mm	20	10	..	..	..	..	..	..	280	20	..	300
Mortar, 4.2"	12	8	..	..	..	..	..	..	168	16	..	184
Bazooka	20	10	..	..	5	45	45	..	280	20	..	390
AT Missile SS-10/11	12	4	..	..	..	78	..	..	168	8	..	254
RR, 106mm	6	4	..	..	..	..	..	..	84	8	..	92
APC, Halftrack	50	200	20	12	3	126	27	24	700	400	160	1,437
AA, lt, 20mm	16	12	12	6	2	140	18	12	224	24	96	514
AA, lt, 40mm	..	..	..	..	4	76	36	..	..	..	..	112
Hawk	..	..	..	..	..	50	..	..	..	..	..	50
How, 105mm	..	..	..	..	..	..	(4)96	..	..	..	..	96
How, 155mm	..	..	..	..	..	..	(3)72	..	..	..	..	72
Gun, 155mm	..	..	..	..	..	..	(1)24	..	..	..	..	24
Gun, 175mm	..	..	..	..	..	..	(1)12	..	..	..	..	12
Tanks	10	30	90	40	..	..	..	80	140	60	720	1,000
AMX-113	..	10	(30)	(40)(10)	..	..	..	(80)(20)	..	20	(240)	150
M-48 (90)	..	..	..	..	..	..	..	..	..	..	..	200
Super Sherman	10	20	(90)(60)	(30)	..	..	..	(60)	140	40	(720)(480)	400
Centurion	..	..	..	..	..	..	..	..	..	..	..	250
APC, Halftrack	50	200	20	12	3	125	27	24	700	400	160	1,436
Trucks	150	150	150	75	100	2,500	900	150	2,100	300	1,200	8,586
SP Mounts	30	30	38	19	25	200	225	38	420	76	304	1,263

Figure 3. ESTIMATED EGYPTIAN ARMAMENT SUMMARIES, 1967

	Inf Div	Tank Div	Tank Bde	Inf Bde	Arty Rgt	1/10 Div Misc Units	15 Arty Rgts	5 Inf Divs	2 Tank Divs	5 Inf Bdes	7 Tank Bdes	Totals
Personnel	10,000	10,000	3,500	4,000	1,000	15,000	15,000	50,000	20,000	20,000	24,500	144,500
Pistol	1,000	1,000	350	400	100	1,500	1,500	5,000	2,000	2,000	2,450	14,450
Rifle	9,000	9,000	3,150	3,600	900	13,500	13,500	45,000	18,000	18,000	22,050	130,050
Machine Gun, lt	360	270	85	120	75	200	1,125	1,800	540	600	595	4,860
Machine Gun, hvy	240	160	55	80	75	150	1,125	1,200	320	400	385	3,580
Mortar, 2"	20	10	12	10	..	50	..	100	20	50	84	304
Mortar, 82mm	50	..	..	16	..	..	..	250	..	80	..	330
Mortar, 120mm	12	..	..	4	..	..	..	60	..	20	..	80
RL, 40mm	50	10	..	16	10	100	150	250	20	80	..	600
GAT, 85mm	48	24	..	24	..	..	..	240	48	120	..	408
Schmel AT Missile	24	12	..	8	..	..	..	120	24	40	..	184
RR, 107mm	24	12	..	8	..	..	..	120	24	40	..	184
AMG ZPU-2	9	9	6	6	6	100	90	45	18	30	42	325
AAMG ZPU-4	9	9	..	..	..	100	..	45	18	..	..	163
AA, 37mm	6	6	..	..	..	50	..	30	12	..	..	92
AA, 57mm	12	6	..	..	..	50	..	60	12	..	..	122
AA, 85mm	..	..	..	..	..	..	(5)120	..	..	..	..	120
Mortar, 240mm	..	..	..	..	..	..	(4) 96	..	..	..	..	96
How, 122mm	54	36	..	..	..	..	(3) 72	270	72	..	..	414
Gun How, 15 mm	12	..	..	..	..	..	(2) 48	60	..	..	..	108
Gun, 130mm	..	..	..	..	..	..	(1) 24	..	..	..	..	24
AT Su-100 SP	12	10	..	4	..	..	..	60	20	20	..	100
JS-3	12	10	..	4	..	..	..	60	20	20	..	100
PT-76	..	30	10	..	..	..	..	60	..	..	70	130
T-34	20	100	30	..	..	..	..	100	200	..	210	510
T-54/55	..	150	50	..	..	..	..	..	300	..	350	650
APC BTR-50	120	30	10	30	3	..	45	600	60	150	70	925
APC BTR-152	20	10	2	..	..	..	..	100	20	..	14	134
Truck	800	600	200	250	100	500	1,500	4,000	1,800	1,250	1,400	10,450
Motorcycle	60	50	20	20	..	30	..	300	100	100	140	670
SP Mount	36	30	..	10	12	50	180	180	60	50	..	520

Figure 4. ESTIMATED JORDANIAN ARMAMENT SUMMARIES, 1967

	Inf Bde	Armd Bde	Arty Bn	1/10 Bde Misc Units	8 Inf Bdes	2 Armd Bdes	4 Arty Bns	Totals
Personnel	4,500	4,000	500	2,000	36,000	8,000	2,000	48,000
Pistol	450	400	50	200	3,600	800	200	4,800
Rifle	4,050	3,600	450	1,800	32,400	7,200	1,800	43,200
Machine Gun, lt	120	40	10	25	960	80	40	1,105
Machine Gun, hvy	80	40	20	42	640	80	80	842
Mortar, 81mm	20	10	..	..	160	20	..	180
Mortar 4.2"	12	8	..	..	96	16	..	112
Bazooka	20	10	5	10	160	20	20	210
RR, 106mm	6	4	..	..	48	8	..	56
AA, lt, 20mm	16	12	6	12	128	24	24	188
AA, lt, 40mm	..	..	..	12	..	..	..	12
Gun, 25 pdr	12	..	..	..	(6)72	..	..	72
How, 105mm	..	..	(12)	..	(2)24	..	(1)12	36
How, 155mm	..	..	..	..	..	..	(2)24	24
Gun, 155mm	..	..	(8)	..	..	..	(1) 8	8
Tanks	..	..	..	..	..	..	..	240
M-48	..	90	..	..	..	180	..	180
Centurion	..	30	..	..	..	60	..	60
Trucks	150	150	50	250	1,200	300	20	1,770
SP Mounts	20	20	..	20	160	40	..	220
APC, M113, Saracen	50	20	..	10	400	40	..	540

Figure 5. ESTIMATED SYRIAN ARMAMENT SUMMARIES, 1967

	Inf Bde	Meczd Bde	Tank Bde	Arty Rgt	1/11 Bde Misc Units	10 Arty Bde	6 Inf Bde	3 Meczd Bde	3 Tank Bde	Totals
Personnel	4,000	4,500	3,500	800	4,000	8,000	24,000	13,500	10,500	60,000
Pistol	400	450	350	80	400	800	2,400	1,350	1,050	6,000
Rifle	3,600	4,050	3,150	720	3,600	7,200	21,600	12,150	9,450	54,000
Machine Gun, lt	270	300	85	75	50	750	1,620	900	255	3,575
Machine Gun, hvy	160	180	55	75	40	750	960	900	165	2,815
Mortar, 82mm	20	20	..	..	..	..	120	60	..	180
Mortar, 120mm	4	4	..	..	..	..	24	12	..	36
RL, 40mm	16	16	10	10	25	100	96	48	30	299
GAT, 85mm	32	32	..	..	..	..	192	96	..	288
RR, 107mm	8	8	8	..	..	..	48	24	24	96
AAMG ZPU-2	6	6	3	6	25	60	36	18	9	148
AAMG ZPU-4	6	6	3	..	25	..	36	18	9	88
AA, 37mm	4	4	4	..	20	..	24	12	12	68
AA, 57mm	4	4	..	..	20	..	24	12	..	56
AA, 85mm	..	..	..	..	(2)48	..	..	..	..	48
Mortar, 240mm	..	..	..	..	..	(1)24	..	..	..	24
Katushya	..	..	..	..	..	(1) 8	..	..	..	8
How, 122mm	12	12	..	..	..	(4)96	72	36	..	204
Gun How, 152mm	..	..	..	..	..	(3)72	..	..	..	72
Gun, 130mm	..	..	..	..	..	(1)24	..	..	..	24
AT Su-100 SP	12	12	12	..	..	..	72	36	36	144
JS-3	8	8	24	..	..	..	48	24	72	144
PT 76	..	10	10	..	..	..	..	30	30	60
T-34	30	..	30	..	..	..	180	..	90	270
T-54/55	..	60	60	..	..	..	..	180	180	360
APC BTR-50	40	60	20	3	10	30	240	180	60	520
APC BTR-152	10	10	5	..	2	..	60	30	15	107
Truck	250	275	250	100	120	1,000	1,500	825	750	4,195
Motorcycle	20	20	20	..	10	..	120	60	60	250
SP Mount	10	20	10	12	12	120	60	60	30	282

Figure 6. ENGAGEMENTS, SIX-DAY WAR, JUNE 1967

Eng No	Date	Engagement Designation	Arab Forces	Israeli Forces
<u>Sinai</u>	June		<u>Egyptian</u>	
67- 1	5	Rafah	PLA & 7 Inf Div	Tal's Div
67- 2	5/6	Aby Ageila-Um Katef	2 Inf Div	Sharon's Div
67- 3	5-7	Gaza Strip	PLA Div	Tal's Div
67- 4	5/6	El Arish	7 Inf Div	Tal's Div
67- 5	5/6	Bir Lahfan	3 Inf Div	Yoffe's Div
67- 6	6	Jebel Libni	3 Inf Div	Yoffe's Div
67- 7	7	Bir Hama-Bir Gifgafa	3 Inf Div & 21 Tank Div	Tal's Div
67- 8	7	Bir Hassna-Bir Thamada	3 Inf Div & 4 Tank Div	Yoffe's Div
67- 9	7/8	Mitla Pass	3 Inf, 6 Inf Divs	Yoffe's Div
67-10	8	Bir Gifgafa	4 Tank Div	Tal's Div
67-10.1	8	Nakhl	6 Meczd Div	Sharon's Div
<u>Jerusalem- West Bank</u>			<u>Jordanian</u>	
67-11	5-7	Jerusalem	Jerusalem Bde(+)	Central Command
67-12	5/6	Jenin	25 Inf Bde	Peled's Div
67-13	6/7	Kabatiya	40 Armd Bde, 25 Inf Bde	Peled's Div
67-14	6/7	Tilfit-Zababida	40 Armd Bde, 25 Inf Bde	Ram's Bde
67-15	7	Nablus	Brigade equiv	Ram's Bde, Kochva's Bde
<u>Golan Hts</u>			<u>Syrian</u>	
67-21	9	Zaoura-Kala	11 Inf Bde	Mendler's Bde
67-22	9	Tel Fahar	11 Inf Bde	Golani Bde
67-23	9	Rawiya	8 Inf Bde	Ram's Bde
67-24	10	Banias-Masaada	11 Inf Bde	Golani Bde
67-25	10	Kuneitra	Syrian Meczd Bde	Mendler's Bde
67-26	10	Boutmiya	Syrian Armd Bde	Peled's Div

Figure 7. ESTIMATED ALLOCATION OF BATTLE CASUALTIES, SINAI FRONT, JUNE 5-8, 1967, INCLUSIVE

Date	Engagements								Egyptian			Israeli		
	Egypt	Israel	Egypt	Israel	Egypt	Israel	Egypt	Israel	Daily Eng	Daily Misc	Cumulative	Daily Eng	Daily Misc	Cumulative
June 5	(1) 3,000	(1) 500	..	..	..	..	..	..	3,000	..	3,000	500	..	500
	..	..	(2) 1,000	(2) 200	(3) 250	(3) 45	(4) 250	(4) 85	1,500	..	4,500	300	30	860
6	..	..	..	..	(3) 500	(3) 20	..	..	500	500	5,500	20	..	880
	(5) 500	(5) 50	..	..	..	..	..	..	500	..	6,000	50	..	930
7	(6) 500	(6) 40	(7) 600	(7) 45	(8) 600	(8) 30	..	..	1,700	1,500	9,200	115	10	1,045
	..	..	..	..	..	..	(9) 600	(9) 60	600	..	9,800	60	..	1,105
8	(10) 500	(10) 40	(11) 684	(11) 24	..	..	..	..	1,184	1,900	12,884	64	15	1,194

Figure 8. ESTIMATED ALLOCATION OF TANK LOSSES, SINAI FRONT, JUNE 5-8, 1967, INCLUSIVE

Date	Engagement								Egyptian				Israeli			
	Egypt	Israel	Egypt	Israel	Egypt	Israel	Egypt	Israel	Daily Loss	Cum Loss	Daily Return	Cum Net Loss	Daily Loss	Cum Loss	Daily Return	Cum Net Loss
June 5	(1) 70	(1) 15	..	..	..	..	..	..	70	70	..	70	15	15	..	15
	..	..	(2) 40	(2) 19	(3) 60	(3) 4	(4) 80	(4) 13	180	250	..	250	36	51	..	51
6	..	..	..	..	(3) 30	(3) 4	..	..	30	280	5	275	4	55	2	53
	(5) 30	(5) 11	..	..	..	..	..	..	30	310	..	305	11	66	..	64
7	(6) 30	(6) 10	(7) 30	(7) 5	(8) 30	(8) 10	..	..	90	400	18	377	25	91	6	83
	..	..	..	..	..	..	(9) 100	(9) 16	100	500	..	477	16	107	..	99
8	(10) 100	(10) 11	(11) 100	(11) 4	..	..	..	..	200	700	27	650	15	122	9	105
	..	..	..	..	..	..	..	..	..	..	10	640	..	..	44	61

Figure 9. ESTIMATED CLOSE AIR SUPPORT FIGHTER-BOMBER SORTIES
SUEZ-SINAI FRONT, JUNE 5-8, 1967, INCLUSIVE

Date	Available Sorties		Engagements							
	Egypt	Israel	Egypt	Israel	Egypt	Israel	Egypt	Israel	Egypt	Israel
June 5	61	78	(1) 51	(1) 78	..	..	(2) 0	(2) 0	(3) 10	(3) 38
	..	..	..	..	(2) 0	(2) 0	(3) 10	(3) 38	(4) 0	(4) 38
6	20	152	(5) 20	(5) 76	..	..	..	..	..	..
7	0	152	(6) 0	(6) 52	(7) 0	(7) 40	(8) 0	(8) 40	..	..
	..	..	..	..	..	..	..	..	(9) 0	(9) 20
8	0	245	(10) 0	(10) 123	(11) 0	(11) 122	..	..	..	..

Figure 10. ESTIMATED ALLOCATION OF BATTLE CASUALTIES, JORDAN FRONT, JUNE 5-7, 1967, INCLUSIVE

Date	Engagements								Jordanian			Israeli		
	Jordan	Israel	Jordan	Israel	Jordan	Israel	Jordan	Israel	Daily Eng	Daily Misc	Cumulative	Daily Eng	Daily Misc	Cumulative
June 5	(11) 1,500	(11) 600	..	..	..	..	..	..	1,500	1,000	3,000	600	100	700
	..	..	(12) 800	(12) 400	..	..	..	..	800	1,200	4,500	400	..	1,100
6	(11) 1,000	(11) 800	..	..	(13) 1,000	(13) 550	(14) 500	(14) 253	2,500	1,000	8,000	1,603	100	2,803
	..	..	..	..	..	..	..	..	..	1,000	9,000	..	..	..
7	(11) 1,000	(11) 350	(15) 1,000	(15) 600	..	..	..	..	2,000	2,000	13,000	950	100	3,853

Figure 11. ESTIMATED ALLOCATION OF TANK LOSSES, JORDAN FRONT, JUNE 5-7, 1967, INCLUSIVE

Date	Engagement								Jordanian				Israeli			
	Jordan	Israel	Jordan	Israel	Jordan	Israel	Jordan	Israel	Daily Loss	Cum Loss	Daily Return	Cum Net Loss	Daily Loss	Cum Loss	Daily Return	Cum Net Loss
June 5	(11)50	(11)20	(12)40	(12)18	..	..	..	..	50	50	..	50	20	20	..	20
	..	..	..	..	..	..	..	..	40	90	..	90	18	38	..	38
6	(11)20	(11)10	..	..	(13)44	(13)18	(14)36	(14)18	100	190	6	184	46	84	6	78
7	(11)20	(11)10	(15)46	(15)18	..	..	..	..	66	256	12	238	28	112	10	96
											10	228			40	56

Figure 12. ESTIMATED CLOSE AIR SUPPORT FIGHTER-BOMBER SORTIES
JORDANIAN FRONT, JUNE 5-7, 1967, INCLUSIVE

Date	Available Sorties		Engagements							
	Jordan	Israel	Jordan	Israel	Jordan	Israel	Jordan	Israel	Jordan	Israel
June 5	11	76	(11) 11	(11) 38	(12) 0	(12) 0	..	..	..	..
	..	..	..	38	..	..	..	..	..	..
6	0	112	(11) 0	(11) 40	..	..	(13) 0	(13) 21	(14) 0	(14) 21
	..	..	..	30	..	..	..	..	..	..
7	0	104	(11) 0	(11) 52	(15) 0	(15) 52	..	..	..	..

Figure 13. ESTIMATED ALLOCATION OF BATTLE CASUALTIES, GOLAN FRONT, JUNE 9-10, 1967, INCLUSIVE

Date	Engagements								Syrian		Israeli			
	Syria	Israel	Syria	Israel	Syria	Israel	Syria	Israel	Daily Eng	Misc	Cumulative	Daily Eng	Misc	Cumulative
June 9	(21)1,000	(21)100	(22)1,500	(22)150	(22) 600	(23) 68	..	..	2,500	1,000	3,500	250	..	250
	..	..	..	..	..	..	..	..	600	400	4,500	68	..	318
10	(24) 500	(24) 50	(25) 500	(25) 50	(26) 500	(26) 50	..	..	1,500	600	6,600	150	..	468

Figure 14. ESTIMATED ALLOCATION OF TANK LOSSES, SYRIAN FRONT, JUNE 9-10, 1967, INCLUSIVE

Date	Engagement								Syrian				Israeli			
	Syria	Israel	Syria	Israel	Syria	Israel	Syria	Israel	Daily Loss	Cum Loss	Daily Return	Cum Net Loss	Daily Loss	Cum Loss	Daily Return	Cum Net Loss
June 9	(21)15	(21)40	(22)10	(22) 5	..	(23)10	(23)10	..	25	25	..	25	45	45	..	45
	..	..	..	..	(23)10	(23)10	..	..	10	35	..	35	10	55	..	55
10	(24)15	(24)35	(25)20	(25)35	(26)30	(26)35	..	..	65	100	3	97	105	160	6	154
											5	92			74	80

Figure 15. ESTIMATED CLOSE AIR SUPPORT FIGHTER-BOMBER SORTIES
GOLAN FRONT, JUNE 9-10, 1967, INCLUSIVE

Date	Available Sorties		Engagements							
	Syria	Israel	Syria	Israel	Syria	Israel	Syria	Israel	Syria	Israel
June 9	0	238	(21) 0	(21)119	(22) 0	(22)119	(23) 0	(23) 0		
10	0	231	(24) 0	(24) 77	(25) 0	(25) 77	(26) 0	(26) 77		

Figure 16. ENGAGEMENT DATA CALCULATION INPUT SHEET

Engagement No: 67-1 Date of Calc: 17 May '76
 Engagement Date: 5 June 1967
 Terrain: Flat Mixed/Desert
 Posture: Fort/ Prepared Defense
 Weather: Hot, Dry
 Season: Spring
 Unit: 7th Div (-) & PLA Div (-), Egypt
 Depth: 8.8 Q: -45
 Personnel Losses: 3,000
 Tank Losses: 70
 Mission Factor: 2

	OLI	Number	Total OLI
N Personnel		19,500	
W _s Pistol, Beretta	0.03	1,950	59
Rifle, AK-47	0.26	17,550	4,563
W _{mg} MG Lt., SGM 7.62	0.58	485	281
MG Hvy., DK 12.7	0.89	323	287
W _{hw} Mortar, 50mm	27	48	1,296
Mortar, 82mm	44	47	2,068
Mortar, 120mm	58	12	696
APC, BTR-50	58	109	6,322
APC, BTR-152	23	9	207
W _{gi} RL, 40mm	20	60	1,200
Schmel AT Missile	34	23	782
RR, 107mm	101	23	2,323
Gun AT, D-48, 85mm	192	62	11,904
Gun, 100mm	229	12	2,748
How, M-38, 122mm	159	52	8,268
Gun How, D-20, 152mm	231	4	924
W _{gy} MMG, ZPU-2	27	36	972
AAMG, ZPU-4	37	16	592
AAG, 37mm	66	8	528
Gun AA S-60, 57mm	168	10	1,680
W _i Gun, AT, SP, SU-100 (TD)	388	12	4,656
Tank Hvy, T-10/JS-3 av.	281	12	3,372
Tank Lt, PT-76	212	13	2,756
Tank, T-34	280	45	12,600
Tank, Sherman	210	50	10,500
Tank, T-54)	av. 505	65	32,825
Tank, T-55)			
W _y MiG-17	731	18/2	6,579
Total OLI			120,988
J Trucks		1,209	
APC, Tack, Halftrack		155	
Motorcycle		88	
Helicopters		22	

Engagement No: 67-1 Date of Calc: 17 May '76
 Engagement Date: 5 June 1967
 Terrain: Flat Mixed/Desert
 Posture: Attack
 Weather: Hot, Dry
 Season: Spring
 Unit: Tal Div, Israel
 Depth: 8.8 Q: 45
 Personnel Losses: 500
 Tank Losses: 15
 Mission Factor: 9

	OLI	Number	Total OLI
N Personnel		19,520	
W _s Pistol, cal .45	0.02	1,952	39
Rifle, Galil	0.22	17,568	3,865
W _{mg} Machine gun, cal 7.62mm	0.82	283	232
Machine gun, cal 12.7mm	1.04	292	304
W _{hw} Mortar, 81mm	50	20	1,000
Mortar, 4.2" (107mm)	90	12	1,080
Halftrack, M3	27	125	3,375
W _{gi} Bazooka	14	41	574
ATM SS 10/11	34	18	612
RR-SP, 106mm	133	6	798
W _g How SP, 105mm	160	48	7,680
How SP, 155mm	235	24	5,640
Gun SP, 155mm	303	12	3,636
W _{gy} Gun AA, SP, Lt 20mm	124	67	8,308
Gun AA, SP, Lt 40mm	146	20	2,920
SAM, Hawk	300	4	1,200
W _i Tank, M4 (105mm)	470	45	21,150
Tank, M48 (90mm)	474	45	21,330
Tank, Centurion	536	45	24,120
Tank, AMX-13 (90mm)	321	105	33,705
W _y Mystere IV	1,404	23/2	17,963
Super-Mystere	1,562	23/2	16,146
Total OLI			175,677
J Trucks		1,105	
APC, Track, Halftrack		361	
Helicopters		39	

Figure 17. MODEL (ENGAGEMENT) CALCULATION FORM

Engagement: No. <u>67-1</u>	Engagement Date: <u>5 June 1967</u>	Calculation Date: <u>17 May 1976</u>
Egyptian Unit: <u>7th Div(-), PLA Div (-)</u>	Posture: <u>Fort/Prep Def</u>	Israeli Unit: <u>Tal Division</u>
Mission Factor <u>2</u>		Mission Factor <u>9</u>

$S_f = (W_s + W_{mg} + W_{hw} + W_{gi}) \times r_n$ $(4622 + 568 + 10589 + 16209) \times .95$ $(W_g + W_{gy}) (r_{wg} \times h_{wg} \times z_{wg} \times w_{yg})$ $(11940 + 3772)(1 \times 1 \times 1 \times .9)$ $W_i \times r_{wi} \times h_{wi}$ $66709 \times .95 \times 1$ $W_y \times r_{wy} \times h_{wy} \times z_{wy} \times w_{yy}$ $6579 \times 1 \times 1 \times 1 \times .8$ $S_f \text{ (total)}$	$= 30,389$ $= 14,141$ $= 63,373$ $= 5,263$ $= 113,166$
---	--

$V_f = N_f \times u_v/r_u \times \sqrt{S_e/S_f} \times v_y \times v_r$ $19500 \times .55/1.19 \times 1.2371 \times 1.1 \times 1$ $v_f = 1 - V_f/S_f = 1-.1094$ $M_F = (N_f + 12J + W_i) \times m_{yf}/N_f$ $[9600 + 12(1209 + 310 + 220) + 66709] \times .9/19500$ $m_d = 1$ $M_a = \sqrt{M_d/M_d} = \sqrt{1.6615}$ $P_f = S_f \times m \times l \times e \times t \times o \times b \times u_s \times r_u \times h_u \times z_u \times v_f$ $113,116 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1.55 \times 1.19 \times 1 \times 1 \times .7812$ $P_f/P_e = .092$	$v_f = 0.8906$ $= 4.9664$ $= 1.2890$ $= 185,900$
--	---

$S_e = (W_s + W_{mg} + W_{hw} + W_{gi}) \times r_n$ $(3904 + 536 + 6455 + 1984) \times .95$ $(W_g + W_{gy}) (r_{wg} \times h_{wg} \times z_{wg} \times w_{yg})$ $[6956 + 6579 + (12425 - 6579)/2] \times 1 \times 1 \times 1 \times 1.1$ $W_i \times r_{wi} \times h_{wi}$ $100,305 \times .95 \times 1$ $W_y \times r_{wy} \times h_{wy} \times z_{wy} \times w_{yy}$ $34109 \times 1 \times 1 \times 1 \times 1.1$ $S_e \text{ (total)}$	$= 11,285$ $= 29,105$ $= 95,290$ $= 37,520$ $= 173,200$
--	---

$V_e = N_e \times u_v/r_u \times \sqrt{S_f/S_e} \times v_y \times v_r$ $19520 \times 1/1 \times .8083 \times .9 \times 1$ $v_e = 1 - V_e/S_e = 1-.0798$ $M_e = (N_e + 12J + W_i) \times m_{yf}/N_e$ $[9520 + 12(1105 + 722 + 390) + 100305] \times 1.1/19520$ $m_a = M_a - (1 - r_m \times h_m)(M_a - 1)$ $1.289 - (1 - .95 \times 1)(.289)$ $P_e = S_e \times m \times l \times e \times t \times o \times b \times u_s \times r_u \times h_u \times z_u \times v_e$ $173,200 \times 1.2745 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times .9202$ $P_e/P_f = 1.09$	$v_e = .9202$ $= 8.2516$ $= 1.2745$ $= 203,128$
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Effects of Surprise

$M_a = \sqrt{1.6615 \times 3} = 2.2326$ $m_a = 2.1710$ $v_f = 1 - (2 \times .1094) = 0.7812$ $P_f = 163,063$ $P_f/P_e = 0.4472$	$m_a = 2.1710$ $v_e = 1 - (.6 \times .0798) = .9521$ $P_e = 364.655$ $P_e/P_e = 2.2363$
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Result Calculations

$$Q = 45, D_f = 8.8, Cas_f = 3,000, Cas_e = 500$$

$E_{fsp} = \sqrt{(S_e \times u_{se})/(S_f \times u_{sf}) \times (4Q + D_e)/3D_f}$ $\sqrt{1.5305 \times 1.55 \times (4 \times 45 + 8.8)/3 \times 8.8}$ $= -2.5538$	$E_{esp} = \sqrt{(S_f \times u_{sf})/(S_e \times u_{se}) \times (4Q + D_f)/3D_e}$ $\sqrt{.6534 \times 1.55 \times (4 \times 45 + 8.8)/3 \times 8.8}$ $= 2.666$
$E_{fcas} = v_e^2 \left[\frac{\sqrt{(Cas_e \times u_{se}/S_e)/(Cas_f \times u_{sf}/S_f)} - \sqrt{100Cas_f/N_f}}{\sqrt{500 \times .6534 \times 1.55/3000} - \sqrt{300000/19500}} \right]$ $.9065 \left[\frac{\sqrt{500 \times .6534 \times 1.55/3000} - \sqrt{300000/19500}}{\sqrt{500 \times .6534 \times 1.55/3000} - \sqrt{300000/19500}} \right]$ $= -3.1865$	$E_{ecas} = v_f^2 \left[\frac{\sqrt{(Cas_f \times u_{sf}/S_f)/(Cas_e \times u_{se}/S_e)} - \sqrt{100Cas_e/N_e}}{\sqrt{3000 \times 1.5305/(1.55 \times 500)} - \sqrt{500 \times 1.9520}} \right]$ $.6103 \left[\frac{\sqrt{3000 \times 1.5305/(1.55 \times 500)} - \sqrt{500 \times 1.9520}}{\sqrt{3000 \times 1.5305/(1.55 \times 500)} - \sqrt{500 \times 1.9520}} \right]$ $= .5224$
$R_f = MF_f + E_{fsp} + E_{fcas} = 2-2.55-3.19 = -3.7403$	$R_e = MF_e + E_{esp} + E_{ecas} = 9+2.67+.52 = 12.19$
$R_f - R_e = -15.93$	$R_e - R_f = +15.93$

Figure 18. PRELIMINARY 1967 ARAB-ISRAELI WAR ANALYSIS

Engagement	N_a/N_i	Fire-power	P/P	Surprise	P/P (S&D)	R - R	Effect P/P	Arab CEV	Israeli CEV	Average
1. Rafa	1.00	0.69	0.92	0.49	0.45	-15.93	0.24	0.53	1.87	
2. Abu Ageila	0.96	1.06	1.80	0.32	0.58	-11.58	0.30	0.52	1.92	
3. Gaza	1.44	0.96	1.41	0.51	0.72	-14.29	0.26	0.36	2.77	
5. Bir Lahfan	0.96	0.53	0.65	.	0.65	-16.85	0.23	0.35	2.83	2.35
11. Jerusalem	0.49	0.42	0.71	0.84	0.60	-8.70	0.36	0.60	1.67	
12. Jenin	0.57	0.34	0.51	0.84	0.43	-9.91	0.34	0.67	1.49	
13. Kabatiya	0.77	0.67	0.83	.	0.83	-6.90	0.42	0.51	1.98	
14. Zababida	1.02	0.57	0.80	.	0.80	-7.98	0.38	0.47	2.11	1.81
21. Qala	1.09	0.43	0.56	.	0.56	-17.87	0.22	0.39	2.56	
22. Tel Fahar	1.11	0.55	0.75	.	0.75	-17.36	0.22	0.29	3.45	
23. Rawiya	1.00	1.77	3.69	0.42	1.55	-12.04	0.29	0.19	5.34	
24. Banyas M.	0.78	0.60	0.85	.	0.85	-15.78	0.24	0.28	3.53	3.71

Figure 19. 1967 ARAB-ISRAELI WAR ANALYSIS—REFINED

Engagement	N_a/N_i	Fire-power	Arab Set-Piece Factor	P/P	Surprise	Disruption	P/P (S&D)	R - R	Effect P/P	CEVs Arab	CEVs Israeli	Average
1. Rafa	1.00	0.69	1.3	1.20	0.37	.	0.44	-15.93	0.24	0.54	1.84	
2. Abu Ageila	0.96	1.06	1.3	2.34	0.24	.	0.56	-11.58	0.30	0.53	1.87	
3. Gaza	1.44	0.96	1.3	1.48	0.38	0.31	0.51	-14.29	0.26	0.51	1.96	
5. Bir Lahfan	0.96	0.53	.	0.65	.	0.77	0.50	-16.85	0.23	0.46	2.18	1.96
										1st half average:		1.86
										2d half average:		2.07
11. Jerusalem	0.49	0.42	1.3	0.92	0.67	.	0.61	-8.70	0.36	0.59	1.69	
12. Jenin	0.57	0.34	1.3	0.66	0.63	.	0.42	-9.91	0.34	0.81	1.24	
13. Kabatiya	0.77	0.67	.	0.67	.	0.74	0.50	-6.90	0.42	0.57	1.76	
14. Zababida	1.02	0.57	.	0.80	.	0.87	0.70	-7.98	0.38	0.54	1.84	1.63
										1st half average:		1.47
										2d half average:		1.76
21. Qala	1.09	0.43	1.3	0.73	.	.	0.73	-17.87	0.22	0.30	3.34	
22. Tel Fahar	1.11	0.55	1.3	0.98	.	.	0.98	-17.36	0.22	0.23	4.38	
23. Rawiya	1.00	1.77	1.3	4.75	0.32	.	1.53	-12.04	0.29	0.19	5.28	
24. Banyas M.	0.78	0.60	.	0.85	.	.	0.85	-15.78	0.24	0.28	3.53	4.13
										1st half average:		3.86
										2d half average:		4.41

COMBAT PERFORMANCE IN THE 1973 WAR

THE DATA

Figure 20 is a summary of the major statistical ground data of the 1973 "October War," including overall strengths and losses of personnel and selected items of equipment for all major participants. Figure 21 provides comparable air strength and loss data. Figures 22, 23, and 24 present more detailed listings of the principal varieties of ground weapons and combat equipment estimated to be on hand in the Israeli, Egyptian, and Syrian armies as of 6 October 1973, showing presumed allocations to major combat formations, such as divisions and brigades.

Figure 25 is a listing of all major engagements on the Suez-Sinai and Golan Fronts from October 6 through 25. Figure 26 is an estimated breakdown of the presumed total of Israeli and Egyptian casualties on that front, with allocations to days and engagements based upon professional historical and military judgment in consideration of the detailed HERO narrative of operations cited under "Data Sources" in the Introduction to this report. Figure 27 is a comparable breakdown of presumed Israeli and Egyptian tank losses on the Suez-Sinai front, by day and by engagement. Figure 28 is a comparable breakdown of estimated direct air support allocations by the Israeli and Egyptian air forces, also related to engagements and dates. Figure 29 is a listing of engagements on the Golan Front. Figures 30, 31, and 32 give comparable breakdowns of estimated casualties, tank losses and direct air support sorties on the Golan Front.

As in the case of analysis of the 1967 War data, available resources permitted analyses of only twelve engagements on the Suez-Sinai Front and four engagements on the Golan front. This was a total of six more 1973 War engagements than provided for in the Task Order, or a total of eight more engagements overall than provided for in the Task Order.

DATA ANALYSIS

Figure 33, "Preliminary 1973 Arab-Israeli War Analysis," provides the same kind of overall summary of this study's quantitative analysis of the 1973 war as is found in Figure 18 for the 1967 War analyses. Figure 34 provides a further refinement of the quantitative analysis after application to the 1973 War data of the same three hypotheses that were reflected in Figure 19 for the 1967 War.

As with the 1967 War, the refined analysis shown in Figure 26 shows remarkably consistent values in relative combat effectiveness of the opponents in each of the two sets of data: that for the Suez-Sinai front, and that for the Golan front. It shows that the Israeli combat effectiveness superiority over the Egyptians was on the average 116%, or a CEV of 2.16; Israeli superiority over the Syrians was 175% or a CEV of 2.75.

A normalized comparison, similar to that for the 1967 War, is shown below:

Israelis	2.75	(2.16)
Egyptians	1.27	(1.00)
Syrians	1.00	

CAMPAIGN ANALYSES

In order to seek possible effects of high command performance, and of airpower, on the overall campaign results and on calculated CEVs—as opposed to the individual engagement results—QJM analyses were performed on the overall campaign data and results for the three 1967 War campaigns and the two 1973 War campaigns. The results of these analyses are summarized in Figure 35.

Figure 20-A. ESTIMATED GROUND STRENGTHS, OCTOBER 1973

	Israel	Total Arab Committed	Egypt	Syria	Iraq Committed	Jordan Committed	Other Arabs	Iraq Total	Jordan Total	Total Arab Potential
Available Army Manpower ¹	310,000	505,000	315,000	140,000	20,000	5,000	25,000	95,000	75,000	650,000
Tank/Armored Divisions	7	5	2	2	1	..	..	2	2	8
Infantry/Mechanized Divs	..	11	8	3	..	..	..	4	3	18
Separate Brigades	18	47	20	21	..	1	5	?	?	46
Medium Tanks	2,000 ²	4,841	2,200 ⁵	1,820 ⁹	300	150	371	1,200	540	6,131
APCs	4,000 ³	4,320	2,400	1,300	300	200	120	1,500	550	5,870
Artillery (over 100mm)	570	2,055	1,210	655	54	36	100	600	320	2,885
Multiple Rocket Launchers	..	90	70	20	?	..	..	?	..	90
Mortars (over 100mm)	375	650+	350	300	?	?	?	?	?	650+
SSM Launchers	..	42	30	12	..	..	..	?	..	42
SAM Launchers	75	1,280	880 ⁶	360 ¹⁰	20	..	20	?	..	1,280
Strella	..	3,000	2,000	1,000	?	..	?	?	..	3,000
AA Guns	1,000	3,650+	2,750 ⁷	1,900 ¹¹	?	..	?	?	?	3,650+
AT Missiles	280 ⁴	1,200	850 ⁸	350 ¹²	?	..	..	?	..	1,200
AT Rockets	650	5,300+	2,500	2,800	?	?	?	?	?	5,300+
AT Guns	..	2,200+	1,300	900	?	?	?	?	?	2,200+

Notes: ¹Only field army and direct support manpower; for instance, total Israeli mobilized strength was over 350,000, Egyptian over 1,000,000.

²Includes 150 captured T-54/55, modified.

³Includes 3,500+ half-tracks, 500 M-113.

⁴Includes SS-10 and SS-11, apparently not used.

⁵Includes T-62.

⁶Includes 80 SA-6.

⁷Includes 150 ZSU-23-4.

⁸Mostly Sagger, some Snapper.

⁹Includes T-62.

¹⁰Includes 60 SA-6.

¹¹Includes 100 ZSU-23-4.

¹²Mostly Sagger, some Snapper.

Figure 20-B. ESTIMATED LOSSES, OCTOBER 1973

	Israel	Arab Total	Egypt	Syria	Jordan	Iraq	Other Arabs
Personnel							
Killed	2,838*	8,528	5,000	3,100	28	300	100
Wounded	8,800*	19,549	12,000	6,000	49	1,000	500
Prisoners or Missing	508	8,551	8,031	500	--	20	?
Tanks**	840	2,554	1,100	1,200	54	200	?
APCs	400	850+	450	400	--	?	?
Artillery Pieces	?	550+	300	250	--	?	?
SAM Batteries	--	47	44	3	--	--	?
Aircraft	102	360	223	117	--	20	?
Helicopters	?	55	42	13	--	?	?
Naval Vessels	1	15	10	5	--	--	--

*About 10% has been added to officially reported Israeli casualties to represent approximately the wounded who died of their injuries, and the fact that official Israeli figures apparently do not include those wounded not evacuated from aid stations and field hospitals.

**Tanks destroyed or put out of action for one or more days. For instance, the Israelis seem to have repaired and returned to operation about 400 of the tank losses shown here. They also recovered about 300 repairable Arab tanks.

Figure 21-A. AIR FORCE STRENGTHS, OCTOBER 1973

	A R A B S							I S R A E L I S	
	Egypt		Syria		Iraq	Other Arabs	Total Arab	Inventory	Resupply*
	Inventory	Resupply*	Inventory	Resupply*			Inventory		
Fighters									
MiG-21	160	..	110	..	18	23	311	150	20
MiG-19	60	..	..	..	..	..	60	140	36
MiG-17	200	..	120	..	7	24	351	50	
Su-7	130	..	45	..	32	12	219	12	
Hunter	..	..	..	..	16	5	21		
Mirage	..	..	..	..	..	28	28		
Total Fighters	550	93	275	113	73	92	990	352	56
Bombers									
Tu-16	18	..	..	..	..	..	18	8	
Il-28	30	..	..	..	..	..	30		
Total Bombers	48						48	8	?
Total Combat	598		275		73	92	1,038	360	
Transports									
An-12	30	..	..	..	..	..	30	6	
Il-14	40	..	12	..	..	..	52	12	
Il-18	..	..	4	..	..	..	4	10	
Total Transports	70		16				86	30	?
Helicopters									
Mi-6	12	..	6	..	..	..	18	8	
Mi-8	70	..	30	..	..	..	1	12	
Total Helicopters	82	70	36	12		12	130	30	?
Total Non-combat	152		52			12	216	116	?
Total Air Inventory	750		327		73	104	1,254	476	
Losses	265		131		21	30	447	109	
Resupply*	163		125				288	56+	
Total At End of War	648		321		52	74	1,095	423+	
Mandpower	23,000		9,000		?	?	32,000+	17,000	

*October 9-23, inclusive.

Figure 21-B. ESTIMATED AIR LOSSES, OCTOBER 1973

	Egypt	Syria	Iraq	Other Arabs	Arab Total	Israel
A. By Type						
Fighter	222	117	21	30	390	103
Bomber	1	..	..	..	1	..
Transport	..	1	..	..	1	..
Helicopter	42	13	..	..	55	6
Totals	265	131	21	30	447	109
B. By Cause						
Air-to-Air					287	21
To SAM					17	40
To AAA					19	31
Misc or Unknown					66	15
Friendly Forces					58	2
Totals					447	109
C. Damage						
Damaged					125	236
Repaired in One Week					?	215

Figure 22. ESTIMATED ISRAELI ARMAMENT SUMMARIES, 1973

	Inf Bde	Meczd Bde	Armd Bde	Armd Rgt	Arty Rgt	1/12 Div 1/36 Bde Misc Units	30 Arty Rgts	5 Armd Rgts	16 Inf/Para Bde	11 Meczd Bde	10 Armd Bde	Totals
Personnel	4,300	4,000	3,600	1,700	1,000	30,000	30,000	8,500	68,800	44,000	36,000	217,300
Pistol, Cal .45	430	400	360	170	100	3,000	3,000	850	6,880	4,400	3,600	21,730
Rifle (Galil 5.56 FN)	3,870	3,600	3,240	1,530	900	27,000	27,000	7,650	61,920	39,600	32,400	195,570
Machine Gun, lt, Cal .30	120	80	40	30	10	300	300	150	1,920	880	400	3,950
Machine Gun, hvy, Cal .50	80	60	40	30	20	500	600	150	1,280	660	400	3,590
Mortar, 81mm	20	10	..	..	..	..	..	..	320	110	..	430
Mortar, 4.2", 107mm	12	8	..	..	..	..	..	..	192	88	..	280
Mortar, 120mm	..	..	..	..	..	..	(4) 96	..	64	44	..	204
Mortar, 160mm	..	..	..	..	?	..	?	..	..	..	..	?
APC M-113	10	20	10	5	..	..	..	25	160	220	100	505
Halftrack M3	50	200	20	10	3	151	90	30	800	2,200	200	3,471
Bazooka/LAW	20	10	..	..	5	55	150	..	320	110	..	635
RECG, 84mm	..	..	..	..	..	..	..	..	..	..	..	..
RRSP, 106mm	6	..	..	..	..	96	..	..	96	..	..	192
AA, lt, 20mm	16	12	12	6	2	172	60	30	256	132	120	770
AA, lt, 40mm	..	..	..	..	4	92	120	..	..	..	..	212
SAM Hawk	..	..	..	..	..	75	..	..	..	..	..	75
How, SP, 105mm	..	..	..	..	..	..	(9) 216	..	..	..	..	216
How, SP, 155mm	..	..	..	..	..	..	(9) 216	..	..	..	..	216
Gun, SP, 155mm	..	..	..	..	..	..	(4) 96	..	..	..	..	96
Gun, SP, 175mm	..	..	..	..	..	..	(3) 72	..	..	..	..	72
How, SP, 8"	..	..	..	..	..	..	(1) 12	..	..	..	..	12
Tanks	20	48	96	48	..	..	..	240	320	528	960	2,048
Tanks, M48 (90mm)	..	..	..	..	..	..	..	..	..	..	..	100
Tanks, M48 (105mm)	..	..	..	..	..	..	..	..	..	..	..	600
Tanks, Centurion	..	..	..	..	..	..	..	..	..	..	..	600
Tanks, M60	..	..	..	..	..	..	..	..	..	..	..	400
Tanks, T54/55 (105mm)	..	..	..	..	..	..	..	..	..	..	..	200
Tanks, M4 (105mm)	..	..	..	..	..	..	..	..	..	..	..	148
APC, M113	10	20	10	5	..	..	..	25	160	220	100	505
Halftracks	50	200	20	10	3	151	90	50	800	2,200	200	3,491
Trucks	150	150	150	75	100	3,000	3,000	375	2,400	1,650	1,500	11,925
SP Mts	38	38	38	19	25	300	750	95	608	418	380	2,551

Figure 23. ESTIMATED EGYPTIAN ARMAMENT SUMMARIES, 1973

	Inf Div	Armd Div	Meczd Div	Inf Bde	Armd Bde	1/10 Div Army Spt Units	5 Inf Divs	2 Armd Divs	3 Meczd Divs	12 Inf Bdes	8 Armd Bdes	Totals
Personnel	10,000	10,000	12,000	4,000	3,500	64,000	50,000	20,000	36,000	48,000	28,000	246,000
Pistol, 9mm Beretta	1,000	1,000	1,200	400	350	6,400	5,000	2,000	3,600	4,800	2,800	24,600
Rifle (A-47 AKM)	9,000	9,000	10,800	3,600	3,150	57,600	45,000	18,000	32,400	43,200	25,200	221,400
MG, lt, SGM 7.62	360	270	360	120	85	1,800	1,800	540	1,080	1,440	680	7,340
MG, hvy, DK 12.7	240	160	240	80	55	1,200	1,200	320	720	960	440	4,840
Mortar, 82mm	50	..	50	16	..	..	250	..	150	192	..	592
Mortar, 120mm	12	..	12	4	..	206	60	..	36	48	..	350
RPG-7, 82mm	100	20	100	30	6	100	500	40	300	360	48	1,348
Sagger	40	16	40	12	4	15	200	32	120	144	32	543
Inf RR, 82mm	20	..	20	6	..	..	100	..	60	72	..	232
Inf RR, 107mm	10	..	10	3	..	..	50	..	30	36	..	116
SPG-9 RR, 73mm	30	24	30	10	8	50	150	48	90	120	64	522
GAT D-48, 85mm	16	..	16	..	..	..	80	..	48	..	..	128
GAT M-55, 100mm	8	12	8	..	..	210	40	24	24	..	..	298
AAMG ZPU-4	9	9	9	3	3	300	45	18	27	36	24	450
AAMG ZU-23	9	9	9	3	3	300	45	18	27	36	24	450
AAMG ZSU-23-4	12	12	12	4	4	100	60	24	36	48	32	300
AAMG S-60, 57mm	12	12	12	4	4	350	60	24	36	48	32	550
MRL, 122mm	12	4	12	..	..	20	60	8	36	..	..	124
How, 122mm	54	36	54	12	..	224	270	72	162	144	..	872
Gun How, 122mm	..	..	..	..	..	84	60	..	36	..	..	180
Gun How, 152mm	12	..	12	..	..	..	..	..	..	..	..	36
Gun, 180mm	..	..	..	..	..	36	..	..	..	..	..	20/10
Scud/Frog	..	..	..	..	..	20/10	..	..	..	..	..	20/10
Grail SA-7	50	50	50	16	16	100	250	100	150	192	128	920
SA 2/3	..	..	..	..	..	800	..	..	..	..	..	800
SA-6	..	..	..	..	..	80	..	..	..	..	..	80
Gun AT-Su-100, SP	12	..	12	4	..	..	60	..	36	48	..	144
Tank, lt, PT76	..	30	10	..	10	..	..	60	30	..	80	170
Tank, med, T54/55	20	260	80	10	80	..	100	520	240	120	640	1,620
Tank, hvy, T62	..	70	30	..	30	..	..	140	90	..	240	470
APC BTR60	55	..	110	12	..	71	275	..	330	144	..	820
APC BTR50	..	24	120	..	12	46	..	48	360	..	96	550
APC BRDM1	36	12	120	6	6	36	180	24	360	72	48	720
APC BRDM2	3	..	6	1	..	..	15	..	18	12	..	45
APC BMP	2	2	4	..	1	10	10	4	12	..	8	44
BMP/Sagger	3	..	6	1	..	..	15	..	18	12	..	45
Truck	800	600	800	250	200	2,000	4,000	1,200	2,400	3,000	1,600	14,200
Motorcycle	60	50	60	20	20	100	300	100	180	240	160	1,080
SP Mounts	44	34	44	14	10	200	220	68	132	168	80	868

Figure 24. ESTIMATED SYRIAN ARMAMENT SUMMARIES, 1973*

	Inf Div	Armd Div	Inf Bde	Armd Bde	1/10 Div Army Spt Units	1 Meczd Div	2 Inf Divs	2 Armd Divs	11 Sep Inf Bdes	10 Sep Armd Bdes	Totals
Personnel	10,000	10,000	4,000	3,500	25,000	13,000	20,000	20,000	44,000	35,000	157,000
Pistol, Markarov	1,000	1,000	400	350	2,500	1,300	2,000	2,000	4,400	3,500	15,700
Rifle, AK-47	9,000	9,000	3,600	3,150	22,500	11,700	18,000	18,000	39,600	31,500	141,300
MG, lt, 7.62	300	200	90	80	100	300	600	400	990	800	3,190
Mg, hvy, 12.7	200	160	60	50	200	200	400	320	660	500	2,280
Mortar, 82mm	50	..	16	..	..	50	100	..	176	..	326
Mortar, 120mm	12	..	4	..	50	12	24	..	44	..	130
RPG-7, 82mm	100	30	30	10	350	120	200	60	330	100	1,160
Sagger	50	20	12	6	..	50	100	40	132	60	382
SPG-9, 73mm	60	24	20	8	30	60	120	48	220	80	558
GAT M-55, 100mm	24	12	..	..	150	24	48	24	..	..	246
AAMG ZPU-4	9	9	3	3	150	9	18	18	33	30	258
AAMG ZU-23	9	9	3	3	150	9	18	18	33	30	258
AAMG ZSU-23-4	12	12	4	4	40	12	24	24	44	40	184
AAMG S-60, 57mm	12	12	4	4	150	12	24	24	44	40	294
MRL, 122mm	12	..	..	..	10	12	24	..	..	..	46
How, 122mm	54	36	12	12	50	54	110	72	132	120	538
Gun How, 152mm	12	..	..	..	24	12	24	..	..	..	60
Gun, 180mm	..	..	..	..	12	..	..	..	..	..	12
Frog	..	..	..	..	..	12	..	..	..	..	12
Grail SA-7	36	36	12	12	100	36	72	72	132	120	532
SA 2/3	..	..	..	..	300	..	..	..	..	..	300
SA-6	..	..	..	..	60	..	..	..	..	..	60
GAT SU-100	12	..	4	..	..	12	24	..	44	..	80
Tank, lt, PT76	..	30	..	10	..	10	..	60	..	100	170
Tank, med, T54/55	..	180	..	60	..	60	..	360	..	580	1,000
Tank, med, T62	..	90	..	30	..	20	..	180	..	250	450
Tank, hvy, JS 111/110	..	..	..	..	..	30	..	..	..	..	30
Tank, med, T-34	20	..	10	..	..	..	40	..	110	70	220
APC BTR60	50	20	10	10	150	200	100	40	110	100	700
APC BRDM1	30	10	5	5	100	100	60	20	55	50	385
APC BRDM2	15	5	4	4	10	50	30	10	44	40	184
APC BMP	20	20	5	5	45	20	40	40	55	50	250
Trucks	800	600	250	200	500	800	1,600	1,200	2,750	2,000	8,850
Motorcycles	50	40	20	20	20	50	100	80	220	200	670
SP Mounts	44	34	14	10	100	44	88	68	154	100	554

*Plus 1 Moroccan infantry brigade, 1 Jordanian armored brigade, and 1 Iraqi armored division.

Figure 25. SINAI FRONT ENGAGEMENTS, OCTOBER 1973

Eng No	Date	Engagement Designation	Egyptian Forces	Israeli Forces
73- 1	Oct 6	Suez Canal Assault (N)	Second Army	Elements 1 armd & 1 inf bde
73- 2	6	Suez Canal Assault (S)	Third Army	Elements 1 armd & 1 Inf bde
73- 3	7	Second Army Buildup	Second Army	Mendler Div(-) & elms Adan & Sharon
73- 4	7	Third Army Buildup	Third Army	Mendler Div(-)
73- 5	8	Kantara-Firdan	Second Army	Adan & Sharon Divs(-)
73- 6	14	Egypt Offensive (N)	Second Army	Sassoon, Adan & Sharon Divs
73- 7	14	Egypt Offensive (SN)	Third Army	Magen(+)
73- 8	15/16	Deversoir (Chinese Farm I)	1/2 16 Div, 1/2 21 Div	Sharon
73- 9	16/17	Chinese Farm (II)	1/2 16 Div, 1/2 21 Div(+)	Adan(+)
73-10	18	Deversoir West	Second Army elms	Adan(+)
73-11	19-21	Jebel Geneifa	Third Army elms	Adan & Magen
73-12	19-22	Ismailia	Second Army elms	Sharon
73-13	21-22	Adabiya	Third Army elms	Magen
73-14	22	Shallufa I	Third Army elms	Adan
73-15	23/24	Suez	Third Army elms	Adan
73-16	23/24	Shallufa II	Third Army elms	Adan(-)

Figure 26. ESTIMATED ALLOCATION OF BATTLE CASUALTIES, SINAI FRONT, OCTOBER 6-24, 1973, INCLUSIVE

Date	Engagements						Egyptian			Israeli		
	Egypt	Israel	Egypt	Israel	Egypt	Israel	Daily Eng	Misc	Cumulative	Daily Eng	Misc	Cumulative
Oct 6	(1) 300	(1) 125	(2) 200	(2) 75	..	..	500	..	500	200	200	400
7	(3) 350	(3) 400	(4) 250	(4) 300	..	..	600	..	1,100	700	100	1,200
8	(5) 1,000	(5) 1,000	..	..	..	..	1,000	100	2,200	1,000	200	2,400
9	..	..	..	..	..	..	..	500	2,700	..	200	2,600
10	..	..	..	..	..	..	..	300	3,000	..	100	2,700
11	..	..	..	..	..	..	..	300	3,300	..	100	2,800
12	..	..	..	..	..	..	..	300	3,600	..	100	2,900
13	..	..	..	..	..	..	..	200	3,800	..	100	3,000
14	(6) 1,600	(6) 150	(7) 2,000	(7) 250	..	..	3,600	100	7,500	400	150	3,500
15	(8) 700	(8) 300	..	..	..	..	700	..	7,700	..	150	3,600
16	(9) 900	(9) 400	..	..	..	..	900	200	8,400	300	..	3,900
17	(9) 900	(9) 400	..	..	..	..	900	200	9,500	400	100	4,400
18	(10) 900	(10) 300	..	..	..	..	900	200	10,600	400	100	4,900
19	(12) 375	(12) 100	(11) 334	(11) 100	..	..	709	191	11,700	300	100	5,300
20	(12) 375	(12) 100	(11) 333	(11) 100	..	..	708	192	12,600	200	100	5,600
21	(12) 375	(12) 100	(11) 333	(11) 100	..	..	708	192	13,500	200	100	5,900
	..	..	..	..	(13) 200	(13) 50	200	..	14,400	200	100	6,200
22	(12) 375	(12) 100	(14) 1,500	(14) 150	..	..	1,875	725	14,600	50	..	6,250
23	(15) 400	(15) 150	(16) 500	(16) 50	..	..	900	2,300	17,200	250	100	6,600
24	(15) 400	(15) 150	(16) 500	(16) 50	..	..	900	2,300	20,400	200	50	6,850
									23,600	200	50	7,100

Figure 27. ESTIMATED ALLOCATION OF TANK LOSSES, SINAI FRONT, OCTOBER 6-24, 1973, INCLUSIVE

Date	Engagements				Egypt				Israel			
	Egypt	Israel	Egypt	Israel	Daily Loss	Cum Loss	Daily Return	Cum Net Loss	Daily Loss	Cum Loss	Daily Return	Cum Net Loss
Oct 6	(1) 10	(1) 50	(2) 30	(2) 50	40	40	..	40	100	100	..	100
7	(3) 10	(3) 40	(4) 10	(4) 50	20	60	2	58	90	190	10	180
8	(5) 10	(5) 75	..	..	10	70	4	64	75	265	19	236
9	25	10	..	..	25	95	5	84	10	275	26	220
10	25	10	..	..	25	120	7	102	10	285	28	202
11	25	10	..	..	25	145	11	116	10	295	28	184
12	25	10	..	..	25	170	8	133	10	305	20	174
13	20	10	..	..	20	190	10	143	10	315	12	172
14	(6) 110	(6) 15	(6) 150	(6) 25	260	450	11	392	40	355	5	207
15	10	10	..	..	10	460	26	376	10	365	8	209
	(8) 50	(8) 30	..	..	50	510	..	426	30	395	8	231
16	(9) 90	(9) 16	..	..	90	600	24	492	16	411	10	237
17	(9) 150	(9) 16	..	..	150	750	34	608	16	427	11	242
18	(10) 70	(10) 15	..	..	70	820	38	640	15	442	11	246
19	(12) 30	(12) 15	(11) 30	(11) 15	60	880	40	660	30	472	8	268
20	(12) 30	(12) 8	(11) 30	(11) 8	60	940	25	695	16	488	11	273
21	(12) 30	(12) 8	(11) 30	(11) 8	60	1,000	25	730	16	504	9	280
	..	..	(13) 20	(13) 10	20	1,020	22	728	10	514	10	280
22	(12) 30	(12) 10	(14) 30	(14) 10	60	1,080	17	771	20	534	8	292
23	(15) 25	(15) 12	(16) 35	(16) 12	60	1,140	17	814	24	558	9	307
24	(15) 25	(15) 12	(16) 35	(16) 12	60	1,200	17	857	24	582	8	323
							57	800			32	291

Figure 28. ESTIMATED CLOSE AIR SUPPORT FIGHTER-BOMBER SORTIES
SUEZ-SINAI FRONT, OCTOBER 6-24, 1973

Date	Available This Front for CAS		Engagements					
	Egypt	Israel*	Egypt	Israel	Egypt	Israel	Egypt	Israel
Oct. 6	208	141	(1) 104	(1) 70	(2) 104	(2) 70	..	..
7	201	135	(3) 100	(3) 67	(4) 100	(4) 67	..	..
8	200	132	(5) 100	(5) 66	..	..	..	..
9	195	66**	..	..	..	..	..	..
10	191	65**	..	..	..	..	..	..
11	187	62**	..	..	..	..	..	..
12	180	60**	..	..	..	..	..	..
13	179	60**	..	..	..	..	..	..
14	176	289	(6) 44	(6) 72	(7) 44	(7) 72	..	..
15	175	116**	..	..	..	..	..	..
16	167	229	(9) 167	(9) 229	..	..	..	..
17	160	305	(9) 160	(9) 305	..	..	..	..
18	159	305	(10) 159	(10) 305	..	..	..	..
19	148	240	(12) 74	(12) 120	(11) 74	(11) 120	..	..
20	131	302	(12) 115	(12) 151	(11) 115	(11) 151	..	..
21	123	239	(12) 61	(12) 119	(11) 61	(11) 119	..	..
22	113	248	(12) 38	(12) 83	(13) 37	(13) 82	(14) 37	(14) 82
23	112	309	(15) 56	(15) 154	(16) 56	(16) 154	..	..
24	115	309	(15) 57	(15) 154	(16) 57	(16) 154	..	..

*October 6-13, inclusive, one-third Israeli air effort allocated to this front, two-thirds to Golan; thereafter two-thirds to this front, one-third to Golan.

**On dates where no engagements are shown on this front, half available Israeli CAS sorties are allocated to other front, and vice versa.

Figure 29. GOLAN FRONT ENGAGEMENTS, OCTOBER 1973

Eng No	Date	Engagement Designation	Arab Forces	Israeli Forces
73-21	Oct 6/7	Ahmadiye	7 Inf Div(+), 1/2 9 Inf Div	7 Armd Bde, 1/2 Golani Bde
73-22	6/7	Rafid	5 Meczd Div(+), 1/2 9 Inf Div	188 Armd Bde, 1/2 Golani Bde
73-23	7-9	Mt. Hermonit	7 Inf Div(+), 1/2 9 Inf Div, 3d Tank Div	7 Armd Bde(-), 1/3 Golani Bde
73-24	7/8	Nafekh	5 Meczd Div, 1/2 9 Inf Div, 1st Tank Div	Laner & Peled Divs (-)
73-25	8	Mt Hermon I	Moroccan Bde(+)	Golani Bde(-)
73-26	8/9	Hushniya	5 Meczd, 1/2 9 Inf, 1st Tank	Laner & Peled
73-27	10-12	Saassa Offensive	1, 3, 5, 7, 9 Divs(+)	Eytan & Laner
73-28	13	Tel el Hara	Iraqi 3d Tank Div	Laner
73-29	15	Kfar Sharms	Iraqi 3d Tank Div(+)	Laner
73-30	16	Naba	Jordanian 40 Bde(+)	Laner(-)
73-31	19	Arab Counteroffensive	Iraqi 3d, Jordanian 40(+)	Peled
73-32	21	Mt Hermon II	Moroccan Bde(+)	Golani Bde
73-33	22	Mt Hermon III	Moroccan Bde(+)	Golani Bde(+)

Figure 30. ESTIMATED ALLOCATION OF BATTLE CASUALTIES, GOLAN FRONT, OCTOBER 6-22, 1973, INCLUSIVE

Date	Engagements						Arab			Israeli		
	Arab	Israel	Arab	Israel	Arab	Israel	Daily		Cumu- lative	Daily		Cumu- lative
Oct							Eng	Misc		Eng	Misc	
6	(21)200	(21)100	(22)400	(22)300	..	..	600	..	600	400	..	400
	..	..	(22)400	(22)300	..	..	400	..	1,000	300	..	700
7	(21)200	(21)100	(24)300	(24)200	..	..	500	..	1,500	300	..	1,000
	(23)900	(23)350	..	..	..	..	900	..	2,400	350	..	1,350
8	..	..	(24)300	(24)200	(25)100	(25)100	400	200	3,000	300	100	1,750
	(23)900	(23)350	(26)500	(26)200	..	..	1,400	..	4,400	550	..	2,300
9	..	..	(26)500	(26)200	..	..	500	200	5,100	200	100	2,600
10	(27)600	(27)300	..	..	..	..	600	200	5,800	300	100	3,000
11	(27)500	(27)200	..	..	..	..	500	200	6,500	200	100	3,300
12	(27)500	(27)100	..	..	..	..	500	200	7,200	100	100	3,500
13	(28)600	(28)150	..	..	..	..	600	200	8,000	150	100	3,700
14	..	..	..	..	..	..	..	200	8,200	..	100	3,800
15	(29)600	(29)100	..	..	..	..	600	200	9,000	100	100	4,000
16	(30)400	(30)100	..	..	..	..	400	200	9,600	100	50	4,150
17	..	..	..	..	..	..	..	200	9,800	..	50	4,200
18	..	..	..	..	..	..	..	200	10,000	..	50	4,250
19	(31)600	(31)200	..	..	..	..	600	200	10,800	200	100	4,550
20	..	..	..	..	..	..	..	200	11,000	..	50	4,600
21	(32)200	(32)150	..	..	..	..	200	150	11,350	150	50	4,800
22	(33)200	(33)200	..	..	..	..	200	100	11,650	200	50	5,050

Figure 31. ESTIMATED ALLOCATION OF TANK LOSSES, GOLAN FRONT, OCTOBER 6-22, 1973

Date	Engagement						Arab				Israel			
	Arab	Israel	Arab	Israel	Arab	Israel	Daily Loss	Cum Loss	Daily Return	Cum Net Loss	Daily Loss	Cum Loss	Daily Return	Cum Net Loss
Oct														
6	(21) 75	(21) 8	(22) 50	(22) 35	..	..	125	125	..	..	43	43	..	..
	..	..	50	35	..	..	50	175	8	167	35	78	5	73
7	(21) 75	(21) 8	(24) 38	(24) 8	..	..	113	288	12	268	16	94	8	81
	(23)105	(23) 25	..	..	..	..	105	393	20	353	25	119	9	97
8	..	..	(24) 38	(24) 8	(25) 0	(25) 0	38	431	25	366	8	127	12	93
	(23)105	(23) 25	(26) 75	(26) 15	..	..	180	611	30	516	40	167	12	121
9	..	..	(26)100	(26) 14	..	..	100	711	31	585	14	181	13	122
10	(27) 50	(27) 7	..	..	..	..	50	761	37	598	7	188	10	119
11	(27) 40	(27) 7	..	..	..	..	40	801	30	608	7	195	11	115
12	(27) 40	(27) 7	..	..	..	..	40	841	29	619	7	202	7	115
13	(28)100	(28) 7	..	..	..	..	100	941	26	693	7	209	9	113
14	25	3	12	..	..	..	37	978	23	700	3	212	3	113
15	(29) 60	(29) 7	12	..	..	..	72	1,050	16	749	7	219	3	117
16	(30) 66	(30) 10	12	..	..	..	78	1,128	19	802	10	229	3	124
17	..	..	20	3	..	..	20	1,148	20	802	3	232	3	124
18	..	..	18	3	..	..	18	1,166	20	820	3	235	3	124
19	(31)100	(31) 11	20	..	..	..	120	1,286	15	925	11	246	3	132
20	..	..	30	4	..	..	30	1,316	21	934	4	250	3	133
21	(32) 0	(32) 0	20	4	..	..	20	1,336	19	935	4	254	3	134
22	(33) 0	(33) 0	18	4	..	..	18	1,354	16	937	4	258	3	135
									34	903			6	129

Figure 32. ESTIMATED CLOSE AIR SUPPORT FIGHTER BOMBER SORTIES
GOLAN FRONT, OCTOBER 6-22, 1973

Date	Available This Front for CAS		Engagements					
	Arab	Israel*	Arab	Israel	Arab	Israel	Arab	Israel
Oct 6	143	281	(21) 71	(21)140	(22) 71	(22)140	..	..
7	139	269	(21) 69	(21)134	(24) 69	(24)134	..	..
8	132	264	(23) 66	(23)132	(24) 66	(24)132	..	..
9	128	349	(23) 64	(23)174	(26) 64	(26)174	..	..
10	128	325	(27)128	(27)325	..	..	..	..
11	117	310	(27)117	(27)310	..	..	..	..
12	113	300	(27)113	(27)300	..	..	..	..
13	103	299	(28)103	(28)299	..	..	..	..
14	100	58**	..	..	..	..	..	..
15	97	232	(29) 97	(29)232	..	..	..	..
16	140	115	(30)140	(30)115	..	..	..	..
17	87	61**	..	..	..	..	..	..
18	85	61**	..	..	..	..	..	..
19	87	120	(31) 87	(31)120	..	..	..	..
20	88	61**	..	..	..	..	..	..
21	85	119	(32) 85	(32)119	..	..	..	..
22	79	124	(33) 79	(33)124	..	..	..	..

*October 6-13, inclusive, two-thirds of Israeli air effort allocated to this front, one-third to Suez-Sinai; thereafter one-third to this front, two-thirds to Suez-Sinai.

**On dates when no engagements are shown on this front, half available Israeli CAS sorties are allocated to other front, and vice versa.

Figure 33. PRELIMINARY 1973 ARAB-ISRAELI WAR ANALYSIS

Engagement	N _a /N _i	Fire-power	P/P	Sur-prise	P/P (S&D)	R - R	Effect P/P	Arab CEV	Israeli CEV
1. Canal Crossing, N	7.68	4.07	1.01	2.57	2.60	6.03	2.21	0.85	1.18
2. Canal Crossing, S	7.92	4.76	1.29	2.40	3.10	7.27	2.45	0.79	1.27
3. Egypt Buildup, N	4.22	2.33	0.94	..	0.94	2.68	1.54	1.64	0.61
4. Egypt Buildup, S	3.90	2.42	0.99	..	0.99	2.92	1.58	1.59	0.63
5. Adan Counterattack	2.48	1.79	2.08	..	2.08	5.54	2.11	1.01	0.99
6. Egypt Offensive, N	1.98	1.41	0.71	..	0.71	-9.34	0.35	0.49	2.04
7. Egypt Offensive, S	2.19	1.64	0.93	..	0.93	-8.23	0.38	0.41	2.44
8. Op Gazelle (Canal)	1.20	0.93	1.31	0.86	1.13	-5.82	0.46	0.45	2.22
9. Chinese Farm	1.25	0.94	1.33	..	1.33	-6.50	0.43	0.30	3.09
10. Deversoir, West	0.95	0.92	1.49	..	1.49	-3.35	0.60	0.40	2.50
11. Geneifa	1.09	0.86	1.14	..	1.14	-7.75	0.39	0.39	2.92
12. Ismailia	1.40	1.09	1.45	..	1.45	-0.40	0.93	0.64	1.56
21. Ahmadiye	3.15	1.19	0.30	1.80	0.54	-6.39	0.44	0.81	1.23
22. Rafid	3.46	1.74	0.68	2.17	1.48	7.57	2.51	0.59	1.70
23. Mt. Hermonit	5.40	3.03	0.72	..	0.72	-4.46	0.53	1.36	0.73
24. Nafekh	1.18	1.01	1.75	..	1.75	-6.14	0.45	3.85	0.26

Figure 34. 1973 ARAB-ISRAELI WAR ANALYSIS—REFINED

Engagement	N _a /N _i	Fire-power	Arab Set-Piece Factor	P/P	Surprise	Disruption	P/P (S&D)	R - R	Effect P/P	CEVs		Average
										Arab	Israeli	
1. Canal Crossing, N	7.68	4.07	1.3	1.31	3.43	..	4.49	6.03	2.21	0.49	2.03	
2. Canal Crossing, S	7.92	4.76	1.3	1.68	3.20	..	5.38	7.27	2.45	0.45	2.20	
3. Egypt Buildup, N	4.22	2.33	1.3	1.22	..	2.61	3.18	2.68	1.54	0.49	2.06	
4. Egypt Buildup, S	3.90	2.42	1.3	1.29	..	2.47	3.19	2.92	1.58	0.50	2.02	
5. Adan Counterattack	2.48	1.79	1.3	2.33	..	1.81	4.22	5.54	2.11	0.50	2.00	
6. Egypt Offensive, N	1.98	1.41	..	0.71	..	..	0.71	-9.34	0.35	0.49	2.04	
7. Egypt Offensive, S	2.19	1.64	..	0.93	..	..	0.93	-8.23	0.38	0.41	2.44	
8. Op Gazelle (Canal)	1.20	0.93	..	1.31	0.70	..	0.92	-5.82	0.46	0.50	2.00	
9. Chinese Farm	1.25	0.94	..	1.33	..	0.80	1.06	-6.50	0.43	0.40	2.47	
10. Deversoir, West	0.95	0.92	..	1.49	..	0.90	1.34	-3.35	0.60	0.45	2.23	
11. Geneifa	1.09	0.86	..	1.14	..	..	1.14	-7.75	0.39	0.34	2.92	
12. Ismailia	1.40	1.09	..	1.45	..	..	1.45	-0.40	0.93	0.64	1.56	2.16
1st half average:											2.06	
2d half average:											2.27	
21. Ahmadiye	3.15	1.19	1.9	0.57	2.40	..	1.37	-6.32	0.44	0.32	3.11	
22. Rafid	3.46	1.74	1.9	1.29	2.90	..	3.74	7.57	2.51	0.67	1.49	
23. Mt. Hermonit	5.40	3.03	..	0.72	..	1.63	1.17	-4.38	0.53	0.45	2.21	
24. Nafekh	1.18	1.01	..	1.75	..	1.15	2.01	-5.14	0.49	0.24	4.17	2.75
1st half average:											2.30	
2d half average:											3.19	

Figure 35. COMPARATIVE CAMPAIGN ANALYSES, 1967, 1973

	N _a /N _i	Fire-power*	Calc P/P	Arab Set-Piece Factor	Revised Calc P/P	Surprise**	P/P (S&D)	R - R	Effect P/P	CEVs	
										Arab	Israeli
1967 - Sinai	1.82	1.37	2.28	1.1	2.46	0.39	0.96	-12.14	0.29	0.30	3.31
1967 - West Bank	0.95	0.65	1.14	1.1	1.25	0.64	0.80	-7.31	0.41	0.38	2.10
1967 - Golan	1.48	1.33	2.10	1.1	2.31	0.83***	1.92	-11.46	0.30	0.14	6.40
1973 - Sinai	2.37	3.03	1.41	1.1	1.55	1.04	1.61	-3.08	0.62	0.38	2.60
1973 - Golan	2.86	2.23	1.93	1.1	2.12	1.04	2.20	-4.65	0.52	0.23	4.23

*Includes actual daily air efforts of opposing sides, not air strengths prior to war.

**Assumes full effect for first three days; thereafter prorated.

***Reflects Israeli surprise night attacks, June 9-10.

OVERALL COMPARATIVE EVALUATION

Of all of the results of the quantitative analysis, the most significant are the relative Israeli-Egyptian CEVs for 1967 and 1973. In both instances the opponents were representative of the best military force the respective nations could at that time put in the field, with experienced officer corps, and with weapons of comparable quality and sophistication. In the 1967 War the Egyptians suffered the disruption resulting from moderate or substantial surprise; in the 1973 War the Israelis suffered disruption from practically complete surprise.

After allowing for the surprise disruption by identical procedures in both cases, and consistently applying the other variables of combat to the forces committed in a number of battles, the average Israeli CEV with respect to the Egyptians was 1.96 (although apparently increasing as time went on; see below). Following the identical procedure for the 1973 War the average Israeli CEV with respect to the Egyptians for the war was 2.16, although it was apparently only 2.06 after four days of combat. Whichever value we use (2.16 for the war as a whole, or 2.06 for a comparable period of four days of combat) the conclusion is the same. In the one instance the numbers suggest that the Israeli combat effectiveness superiority over the Egyptians had increased by about 10% in the intervening six years, in the other case that the gap had widened by 5%.

The significant thing is that, although the differential was still close to the same—about two-to-one factor in favor of the Israelis—the gap had not narrowed between 1967 and 1973; if anything it had widened. This is completely contradictory to the conventional reasoning, which has suggested that the Arabs did so much better in 1973 than in 1967 because they had learned from their 1967 lessons, and had utilized the time to improve themselves, while the Israelis, arrogant and overconfident, had not made comparable efforts.

Serious study of the matter, however, reveals not only that the conventional reasoning is wrong, it also reveals why it is wrong.

Demonstration that the 1973 performance is not an indicator of improved Arab performance is as follows:

1. In 1967, the Israelis started with surprise; the Arabs never recovered, in fact never had a chance to recover;
2. In 1973 the Arabs started with greater surprise than the Israelis achieved in 1967. Yet within three days the Israelis had recovered, and were fighting on equal terms with the Arabs. This is one of the most remarkable recoveries in military history.
3. One reason the initial Israeli frontier victories in 1967 were followed so quickly by Arab collapse is that the Israelis had eliminated the Arab air arm, and were able to use their own air in unchallenged, massive attacks that completed the demoralization of the Arab ground forces. Thanks to the acquisition of Soviet air defense weapons in great numbers between 1967 and 1973, in the latest war the Arabs were able to prevent the Israeli air from having a comparable field day.
4. In 1967 the overall Arab commander in chief, and the man directly responsible for the Sinai front, was a political appointee, a drunk and a drug addict, who seems to have been under both of the latter influences shortly after he learned of the destruction of his air force. In 1973 the Egyptians (and also the Syrians) were led by men who, if not the equal of their Israeli opponents (Ismail probably can be compared not unfavorably with them), were at least competent soldiers who did not lose their heads either in victory or in adversity.

Because of the assumptions involved, the overall campaign analyses shown in Figure 35 are not so reliable as those for the engagements. However, they suggest

an interesting quantitative corroboration of the qualitative arguments presented above.

The 1967 Jordanian campaign performance analysis suggests an Israeli CEV with respect to the Jordan Army of 2.10, which is 29% higher than the average CEV for the four battles analyzed. Since the Jordanian high command does not seem to have made any serious blunders during the campaign, it can be hypothesized that most of the 29% difference is due primarily to the effects of airpower on the overall outcome.

The 1967 Egyptian campaign performance analysis provides an Israeli/Egyptian CEV of 3.31, which is 69% higher than the average CEV for the four battles analyzed. If we accept the same hypothesis for the demoralizing and casualty-producing effect of the vigorous application of unchallenged airpower, this leaves 40% attributable to the inept leadership of Field Marshal Amer.

The 1967 Syrian campaign performance analysis indicates an Israeli CEV with respect to the Syrian Army of 6.40, which is 55% higher than the average Israeli CEV for the four battles analyzed. Again hypothesizing that 29% of this differential is due to the application of Israeli airpower, this leaves 26% attributable to the extreme ineptitude of the Syrian high command, which failed to employ its forces adequately, or to coordinate the operations of those units that were engaged.

In the Suez-Sinai 1973 campaign analysis, however, the relative Israeli-Egyptian CEV for the campaign is 20% higher than the average calculated for the battles analyzed on that front. This is consistent with a qualitative assessment that Israeli airpower did not significantly affect the overall outcome of these land campaigns, and that the high-level Arab leadership was somewhat less competent in performance than were the subordinate units. The overall analysis for the Syrian front shows an Israeli-Arab CEV 54% higher than for the engagements analyzed. This suggests that the Egyptian high command was about 34% more competent than that of the Syrians.

A comparison of the Israeli vs. Syrian performance in the two wars might, at first glance, appear to contradict the arguments presented above. In fact, however, the Syrian situation was unique, and cannot be the basis for any comparison of this sort.

The Syrian performance in 1967 was one of the most abysmal in the history of conventional warfare. While the Israeli performance on June 9-10, 1967, was commendable, the results achieved would have been impossible against even a moderately competent military performance. It is almost incredible to a military observer that any military force could have scaled the escarpment from the Huleh Valley to the Golan Plateau in a few hours against a force with the wealth of weapons and equipment available to the Syrians. One must draw the conclusion that, with a few individual exceptions, the Syrian Army was hardly better than a mob in uniform, commanded by individuals who could not cooperate with each other, or coordinate subordinates.

The reason for this is evident in the history of Syria between 1949 and 1967. There had been nine military coups d'etat, and after each coup the successful upstart had cleared out all potential rivals or enemies in the officer corps. The result was turmoil in the armed forces, with inevitable incompetence of the sort demonstrated in the 1967 War.

During the following winter, however, there had been one more coup d'etat, led this time by the then Minister of War, Air Force General Hafez al Assad. The new President again swept the senior commanders away (the evidence of the recent war suggests that this could not have done serious harm), and put in his own men, who have remained as the military leadership of the country ever since. Thus an improvement in Syrian performance, a major improvement, was inevitable, no matter what the Israelis, the Egyptians, or anyone else had also done in the meantime. It would seem surprising, in fact, if the improvement, with respect to the Israelis, had not been at least from a CEV of 0.24 to one of 0.40. There is no known information or technique available which can tell us whether it would have been greater if the Israelis had not also improved, as is evidenced from the analysis of operations against the Egyptians.

The Israelis had not only not fallen behind in the years between 1967 and 1973 but in fact had continued to widen the combat effectiveness gap between themselves and the Egyptians for many reasons, which can be summarized as follows:

- a. Continuous Israeli efforts to improve military performance at all levels and in all respects: training, schooling, mobilization plans and practices, etc.;
- b. A substantially higher R&D capability, and apparently a more intensive R&D effort;
- c. Sound, objective, Israeli professional military analysis of historical experience and current capabilities, in contradistinction to the Arab cultural tendency to allow emotion and wishful thinking to influence evaluation, planning and operational leadership.

First-hand observation of Middle East armies suggest that this situation has not changed since 1973.

An interesting phenomenon, so consistent as to demand recognition, is the fact that in 1973, as in 1967, a series of Arab defeats is invariably followed by declining combat effectiveness. There is no such phenomenon evident as a result of the few Israeli defeats in early October 1973, in fact quite the contrary. It is beyond the scope of this study to initiate any attempt to quantify what is almost certainly a morale and/or disruption phenomenon. It is quite germane to the objectives of the study, however, to note that the phenomenon exists, and must be given consideration in any efforts to assess Arab combat effectiveness in the event of future conflict.

CONCLUSIONS

1. Combat performance of the Israelis with respect to the opposing Arab armies in 1967, and the performance of the Arab armies with respect to each other, can be represented by the following numerical CEV comparisons:

Israelis	4.13	(1.63)	(1.96)	
Jordanians	2.53	(1.00)	--	(1.20)
Egyptians	2.11	--	(1.00)	(1.00)
Syrians	1.00			

or, in percentages:

- a. Israeli 63% superiority over the Jordanians;
- b. Israeli 96% superiority over the Egyptians;
- c. Israeli 313% superiority over the Syrians;
- d. Jordanian 20% superiority over the Egyptians;
- e. Jordanian 153% superiority over the Syrians;
- f. Egyptian 111% superiority over the Syrians.

2. Combat performance of the Israelis with respect to the opposing Arab armies in 1973, and the performance of the Arab armies with respect to each other, can be represented by the following numerical CEV comparisons:

Israelis	2.75	(2.16)
Egyptians	1.27	(1.00)
Syrians	1.00	

Or, in percentages:

- a. Israeli 116% superiority over the Egyptians;
- b. Israeli 175% superiority over the Syrians;
- c. Egyptian 27% superiority over the Syrians.

3. Special circumstances relating to the political and military leadership of Syria in 1967 and in 1973 do not permit the drawing of any firm conclusions from the comparative Israeli vs. Syrian comparisons in 1967 and 1973.

4. Between 1967 and 1973 the gap in combat effectiveness between the Israeli and Egyptian armies widened.

5. Save for the Syrians, there is no reason to believe that any other Arab armed forces improved their military effectiveness relative to the Israelis any more than the Egyptians; the Syrian improvement still leaves them considerably behind the Egyptians.

6. There is no reason to believe that the Arabs have improved their relative effectiveness with respect to the Israelis since 1943; rather it is likely that the qualitative gap has widened further.