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THE EVOLUTION OF EGYPTIAN AIR DEFENCE STRATEGY
1967-1973

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1990

Thesis submitted for the degree of PhD, University of London.
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Abstract of Thesis

The 1973 War was unlike previous wars in the Middle East: the Egyptians decided on a new way of fighting, relying primarily on ground-based air defences for protection against the Israeli Air Force. It was only following the disaster of 1967 that Egypt's military strategy had undergone major revision. Thus, during the period immediately preceding the 1973 War the structure of Egyptian forces was drastically modified, with a significant shift in the balance between aircraft and anti-aircraft weapons in favour of defensive equipment, which indicated the change in Egyptian air strategy. Exactly why and how Egypt changed to this strategy are the central questions posed in this study.

In exploring the conditions which led to the change, this thesis argues that it was during the Egyptian Armed Forces reconstruction period (1967-1970) that the air defence strategy evolved. Egypt was drawn to this strategy by a combination of indigenous and exogenous factors. The study identifies four main ones: the struggle within the Army Command over the structure of the Armed Forces; increasing public pressure on the Egyptian leadership to start the War of Attrition prematurely, coupled with the pressure of time on the reconstruction plan; the Israeli response to the War of Attrition (1969-1970); and finally, Soviet influence. These factors are discussed in separate chapters, followed by an examination of when and how this process of change was formalized. Finally, a discussion of the new Egyptian strategy in action provides further assessment.

Although the internal factors were decisive in bringing about the
external ones, all were needed for the change to take place. The conclusion draws these strands together into an overall assessment of the process by which the Egyptian air defence strategy developed.
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List of Abbreviations

AAA Anti Aircraft Artillery
AA Anti Aircraft
AAM Air to Air Missile
AFSC Armed Forces Supreme Council
APC Armoured Personnel Carrier
ASM Air to Surface Missile
ASU Arab Socialist Union (in Egypt)
C-in-C Commander in Chief
CoS Chief of Staff
EAF Egyptian Air Force
ECCM Electronic Counter Counter Measures
ECM Electronic Counter Measures
EW Electronic Warfare
GHQ General Headquarters
HEC High Executive Committee (in Egypt)
IAF Israel Air Force
IFF Identification Friend or Foe
IISS International Institute for Strategic Studies
PC Presidential Council (in Egypt)
RAF Royal Air Force (UK)
RCC Revolutionary Command Council (in Egypt)
SAM Surface to Air Missile
SSM Surface to Surface Missile

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INTRODUCTION

As the numerous and bloody wars in the Middle East have shown, the Arabs have, in the past, been extremely slow to develop effective strategies for the confrontation with Israel. The lessons, however, have not gone unlearned, and each successive war has further stimulated the Arab nations to modernize and improve their military capability.

Only following the disaster of 1967 did Egypt's military strategy undergo major revision. During the period immediately preceding the 1973 War the structure of the Egyptian forces was drastically modified, with a significant shift in the balance of aircraft - anti-aircraft weapons in favour of defensive equipment, indicative of the change in Egyptian air strategy. Exactly why and how Egypt changed its air strategy are the central questions posed in this study. In attempting an answer, the thesis addresses four issues: first, what was the precise nature of the change, its outline and characteristics; secondly, what internal factors motivated the change and to what extent; thirdly, what external factors influenced this process of change; and fourthly, what impact did this change have on Egypt's strategy and performance. All these issues will be discussed in the context of Egyptian military strategies in the period between 1967 and 1973.
The strategy of relying on ground-based air defence in launching the 1973 offensive is particularly striking in view of Egypt's huge human and material resources and long-established military institutions compared to Israel. Before its neutralization in 1978, Egypt was the largest country involved in the Arab-Israeli conflict; indeed, its population was about ten times that of Israel. It had the largest armed forces in the area, yet despite its numerical advantage, it invariably suffered defeat at the hands of Israel. In 1948 such defeat was blamed on the corruption of the Egyptian leadership and the shortage of effective armament. (1) Following the revolution of 1952, therefore, the new military regime was quick to rectify this latter problem. Additional and improved arms supplies were sought, first from the West, on whose refusal the regime switched successfully to Eastern sources and the Egyptian Armed Forces capabilities were much improved. (2) Nevertheless, in 1956 Egypt again suffered an appalling defeat.

In the Suez campaign of 1956, the first phase of the Anglo-French air operations was offensive—a counter-air attack against the Egyptian Air Force (EAF) which succeeded in forcing it out of the battle. (3) However, international reaction to the campaign caused operations to be halted and forced all participants, including Israel, to withdraw from Egyptian territories. The Egyptian failure to draw crucial military lessons from the experience of 1956 was mainly due to the greatly enhanced political popularity of the Egyptian leaders both inside Egypt and abroad, which blinded them to military facts. (4) On the first day of the 1967 War, the Israelis destroyed over 250 Arab
aircraft on the ground. Only a few hours into the war, 75 percent of the combat strength of the Egyptian Air Force lay wrecked on its own airfields. As a result, the Egyptian ground forces in the Sinai desert were left without air cover and consequently withdrew. Jordan and Syria were defeated in the same manner.

The importance of air power in the Arab-Israeli wars has always been critical. Despite the fact that Egypt has always had greater air power numerically than Israel and that its Air Force was established long before Israel's, the latter's superior performance in 1967 had a profound impact on Egyptian military thinking and strategies. Thereafter, the Egyptians became obsessed with the need to neutralize the Israeli Air Force (IAF) as a precondition to military operations, with the result that air power became a vital, if not the decisive, factor in Egypt's military strategy. This fact is borne out by an observation of Egypt's perception of 1967 and its final outcome. Egypt concentrated her energy on rebuilding her forces and establishing an improved air force capable of challenging the Israelis in the air. Unfortunately, Egyptian miscalculations, coupled with external constraints, not only prevented Egypt from fulfilling her objectives but also contributed to a drift towards a new imbalance in her force structure (i.e. weak air force and huge static air defence) creating a new military reality that Egypt's military command was slow to recognise, and forcing it eventually to change objectives and strategies.
In the wider context, this thesis puts into relief the issues of Arab grasp of the concept of air power, and the dynamics of change in an Arab military institution. Egypt has been chosen as the country for study for a number of reasons. In brief, with its vast population, Egypt, though one of the poorest in terms of income per capita, is nevertheless arguably one of the most advanced of the Arab countries and maintains a dominant position in the Arab World. Its influence is considerable, not least as regards the development of military strategy. As regards the Arab-Israeli conflict, victory or defeat on the Egyptian military front affected, if not determined, the outcome on other Arab military fronts.

Throughout the Arab-Israeli conflict, Egypt by itself has always had a greater number of combat aircraft than Israel, but air power has never been merely a matter of air strength. Behind the front line of any effective air force there must be a comprehensive, well-established infrastructure of support systems, including the skills of maintenance and repair and the training for ground and air skills essential to operational units. The sophistication and availability of such capabilities almost invariably depend upon the character of the nation and on its level of cultural development. An examination of these factors in Egypt (as mentioned above, one of the largest and most scientifically and technologically advanced of the Arab countries) sheds valuable light on Arab capabilities in the air dimension and Arab perceptions of the concept of air power.
Existing Studies

The 1973 War and the strategies of both the Arabs and the Israelis in this war have been the subject of much research and analysis in Arabic, Hebrew, English and French. Furthermore, the memoirs of key contemporary figures on both sides, whether military commanders or politicians, have enriched the understanding of the motivation behind the policies of each side and helped in the reconstruction of a clear picture of events. To date, however, there has been little research concerning the evolution of the Egyptian air defence strategy in the period before 1973. Of the existing studies, some review Egyptian strategy in the War of Attrition (1969-1970) or Soviet-Egyptian relations, whether in depth or as a general summary, while others deal with specific aspects of Egypt's policies during that period.

The two studies that most closely approach the subject of Egypt's military strategy during the period under study are those by Yaacov Bar-Siman-Tov and Edgar O'Ballance. Since both works were concerned with the War of Attrition itself, they naturally did not focus on the factors that drove Egypt towards a new strategy. Similarly, although the many studies on Soviet-Egyptian relations deal with aspects of the Soviet role in influencing the Egyptian change in strategy, their main focus is on revealing or understanding Soviet behaviour as a superpower in its relationship with a smaller country. Examples include the studies of Alvin Rubinstein, Jon Glassman and Amon Sella, and the books by Mohammad Heikal and Mohrez Hussini.
Thus, the need remains for a study that: examines the objectives of Egypt's military planning after the 1967 War in the context of the country's real capabilities; establishes the connections between Egypt's military behaviour and external circumstances, and compares threats and constraints with responses. Such a study should give a comprehensive answer as to why and how Egypt developed the air defence strategy which was put to the test in the 1973 War, and that is the task which this thesis addresses.

Sources

It must be said at the outset that there is a dearth of material concerning Egypt's defence during the period 1967-1973, compared with the extraordinary wealth of material on the actual 1967 and 1973 wars themselves. What material is available can be broadly divided into five main types: official documents and government publications; studies and reports by non-governmental agencies, both local and foreign; academic works, in book or article form, by local and foreign scholars and experts; memoirs of officials and military men, Egyptian and Israeli; and press items.

Egypt's official documents are particularly scarce owing to the Egyptian perception of security considerations. As in most Third World countries, Egypt's defence-related matters are not openly discussed or put in the public domain. The Egyptian classification system of documents is methodical and security rather exaggerated at times. Training policies, students' theses and training handouts, and
pamphlets in training institutions are all highly classified material. For example, all training instructions and exercises in the Egyptian Staff College have to be returned upon ending the course, and students' note books are strictly checked. What little material is published is of limited use, being largely restricted to generalisations, and therefore, lacking in detail.

A further problem is that the archival systems of most Egyptian military institutions remain undeveloped. For example, the Nasser Academy for higher military studies has no accurate indexing, let alone computerized systems. This is mainly due to the fact that the Armed Forces' attention to the issue of establishing a data bank is only recent. All Egyptian centres for strategic or political studies, whether attached to the Ministry of Defence or independent, were established after 1967. The lack of research centres and the confidential categorization of important documents in the past led to many of these documents becoming lost, and there are indications that Egyptian commanders used to keep documents as their personal belongings upon leaving office. (8)

The publications of other Egyptian governmental agencies are sometimes useful, although they reveal little about defence policies. Examples of these publications are cabinet statements, high-level communiques and presidential speeches. (9) British documents at the Public Record Office are extremely useful sources on the early history of the Egyptian Armed Forces.

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Studies and reports by non-governmental agencies provide detailed analyses of certain aspects of Egypt's defence. The most active local agency is the Al-Ahram Centre for Strategic and Political Studies in Cairo. Its studies have dealt, for example, with Egypt's national security, threat analysis, politico-strategic issues and the decision-making process in Egypt. This centre also recently began to issue a comprehensive annual report on Arab strategic issues. Other studies worth mentioning are those prepared by Arab research centres, whether based in Arab countries or abroad, such as the publications of the Institute for Palestine Studies in Beirut, which focuses on the Arab-Israeli conflict and related issues, and of the Arab Research Centre in London.

Western and Israeli agencies are numerous and are most active in this field. Their publications include several comprehensive studies and much solid research. Among Western reports worth noting are country studies by political and military journals or institutions such as the International Institute for Strategic Studies (IISS), the Royal United Services Institute (RUSI), Jane's publications and Aviation Week and Space Technology.

The volume of books and articles on the general subject is huge and can be divided into several types. Among books of particular interest are several studies focusing on the 1967 War which provide a background history and description of the events of the war, in addition to their assessments and analyses of that war. Examples include books by O'Ballance, Churchill R. and Churchill W., Kimche and
Bawly, Macleish and Young. (10) Edited books include those of Bondy et al, Cornfield, Abu-Lughod and Donovan. (11) These books are most useful in terms of providing background information, but in the context of this thesis, they are too general to offer new insights.

A second type of book focuses on recording, analysing and evaluating the 1973 War. Hundreds of books and studies are available on this topic. (12) Examples include books by Herzog, Badri, Shlomo, Van Creveld, Rayyes, Ahdab, Dupuy, Sabri, Ayoubi, Whetten, O'Ballance, Palit, and Safran. (13) In comparison to the studies of the 1967 War, these studies are more useful as regards this thesis because they usually cover the new Egyptian strategy, providing their respective analyses and evaluations on the topic. Thirdly, there are the studies covering the War of Attrition, 1969-1970, whether in general or in detail. Examples are the books by Dupuy, O'Ballance, Siman Tov, Herzog and the article of Khalidi. (14) Fourthly, there is the type of book which focuses on particular aspects of Egyptian strategic issues. These are represented by Sella, Rubinstein, Glassman and Hussini writing on Soviet-Egyptian relations, and by Heikal whose works cover various strategic issues. (15) These books are extremely useful because they are written by experts in their fields who examine their topic in depth. A further type of books cover the history and performance of a specific corps or military institution in the Middle East during the 1967 and 1973 wars. Examples include books by Fahmi, Labib and Zeeko writing on the Egyptian Air Force and Air Defence, and by Allon, Jackson, Luttwak, Rolbant, Rubinstein, and Weizman writing on the Israeli Army and Air Force. (16) Although they provide detailed and
valuable information, some of the books must be recognized as containing personal bias. Finally, there are various other books on the politics and the government of Egypt. Principal among these are those by Be'erl, Cremeans, Dekmejian, Devore, Haddad, Stephens and Vatikiotis. (17)

The many specialized journals such as Armed Forces Journal International, Military Review and the Royal Air Force Quarterly provide another valuable source of material, and there is a huge number of articles dealing with various aspects of the Middle East wars. (18)

The fourth category of sources used in this research is that of memoirs - fascinating despite their inevitable bias. The publication of Egyptian senior officials' and military commanders' memoirs is a new and growing trend. They provide valuable insight into Egyptian thinking and practice in the defence area, and are of particular importance to this thesis because, unlike many other books and articles, they focus on events preceding the 1973 War and provide a full background to Egyptian military thinking, including internal conflicts and debates, and motives for the military command's decisions during the 1967-1973 period. Yet they are also the most contradictory and suffer from major flaws. (19) The most useful of such memoirs for this study are those by Sadat, Fawzi, Abu-El-Izz, Shazly, Ismail, Ali and Riad. (20) However, the memoirs of their Israeli counterparts such as Dayan, Peres and Rabin, are also useful because they provide a different perspective on certain issues. (21)
Journalistic sources, such as the daily and weekly press and radio broadcasts also provide factual information such as the texts of speeches and statements and interviews revealing various opinions. In addition to the usefulness of opinions presented that reflect official thinking, press items can also be used to reconstruct the chronology of events. Media coverage of events in which the daily activities of the President and senior government officials are extensively reported can also indicate the level of importance of certain issues (measured by the attention they receive and the language used). Another journalistic source comprises items on Egypt and the extensive coverage of Middle East affairs in the non-Egyptian press.

Naturally, the different types of published material are of varying usefulness. Factual reports are occasionally flawed because of misrepresentation and omission. The latter flaw applies especially to local coverage of the war news and Egyptian casualties during the War of Attrition. Personal accounts by Egyptian Presidents and government officials may also suffer from distortion, intentional or otherwise, and a tendency towards over-generalization and vagueness. The best examples of this are the speeches of both Presidents Nasser and Sadat in the period 1967-1973. In some cases, books and articles by former officials or Army personnel use a narrative prose that offers little justification for certain statements other than personal judgement. This is particularly true of writing about the Egyptian forces. (22) Indeed, the considerable restrictions on the freedom of research on defence issues, including the fact that the Armed Forces discourage the kind of analytical writing possible in western societies, must not
be forgotten, and naturally some Egyptian authors may be influenced in their views by their own political allegiance. The latter is illustrated clearly in the memoirs of former Egyptian military commanders. On the other hand, some Israeli authors may be tempted, when writing on the Egyptian Armed Forces, to over-estimate the threat to Israel to justify large defence expenditures and the need for constant preparedness. Nevertheless, many of the most detailed and perceptive analyses of the period and much solid research on Egyptian defence issues have been carried out by non-Egyptians.

Methodology

The subject of this thesis, the evolution of Egyptian air defence strategy, has strongly influenced the choice of methodology used because it has not, as a subject, previously received much attention or been subjected to systematic analysis. In addition, the thesis focuses on the perceptions of and factors influencing Egyptian leaders and military decision-makers, an area which cannot be subjected to quantifiable analysis. Official documents which might provide more insight into Egyptian military thinking and behaviour are not generally available, and much of the published material deals with only one aspect of Egyptian policies or focuses on certain activities during the 1967-1973 period, without exploring the full context. The researcher, therefore, needs to make his own connections between different factors and events. Moreover, most of the published material on Egyptian military thinking — the debates and the factors which influenced them during the period 1967-1973 — has been taken from the
memoirs of people in positions of responsibility at the time. Many of these inevitably suffer from flaws, distortion and personal bias. (24)

Given these considerations, the approach adopted in this thesis embraces more than one method and uses a multitude of threads in constructing one overall picture. In studying external influences on Egyptian military thinking during the period under study, recourse is made to Egyptian public statements that reflect military thinking, and to a review of events that demonstrate actual military behaviour. For example, when observing Israeli military actions and Egyptian reactions to them during the War of Attrition, certain noticeable patterns tend to appear. Both the language used in public statements and official speeches and comments, and the development of a new pattern of military behaviour, act as indicators of particular influences on Egyptian policies. Studies of the policies and motives of other non-Egyptian actors (the USSR, the US and Israel) by scholars such as Sella, Rubinstein, Siman-Tov and O'Ballance are taken as giving useful indications of motives underlying Egyptian actions.

In the relative absence of original documents covering many aspects of Egypt's defence policies, certain assumptions must be made concerning internal influences on Egyptian policies based on the views and writings of former Egyptian officials from within the inner circle of the decision-makers at the time. While accepting the fact that no one view or statement constitutes proof of a particular fact, a statement may, nevertheless, be assumed sometimes to reflect official thinking. Officials' memoirs, along with public statements reveal a
pattern of Egyptian behaviour and the motivation underlying it. Other material such as the minutes of official and confidential meetings and the critiques by some Egyptian authors may be used for further verification and to support such assumptions. (25)

The provisional theses and conclusions reached by the above method can be tested against the views and opinions of participants or expert observers. Among these are people currently or formerly in positions of senior military command and other prominent positions in Egypt, people with personal experience of military affairs and both Egyptian and non-Egyptian experts and scholars with a knowledge of Egypt. The contribution of such authorities comes in the form of published accounts and an analysis of interviews held with them, in addition to direct observation and impressions gained during personal visits to Egypt. These personal sources can suggest particular links between Egyptian defence policies and actual military behaviour. In view of the shortage of original documents on defence policies, the accounts and opinions of participants and observers become an important source on those policies. Generally speaking, the main shortcomings of interviews are that the subject is forced to rely on memory and also is of questionable objectivity. The first problem is alleviated by the fact that the thesis is concerned with the motives underlying defence policies, more than with the accuracy of specific items of information such as dates and names or places. Nevertheless, personal views or assessments are of course most valid when they support, or are supported by other evidence, whether direct or circumstantial.
The interview material for this thesis was collected mainly during a field trip to Egypt in Summer 1988. The trip lasted two and a half months, during which time some forty interviews of varying usefulness were conducted. In addition to interviewing the current Defence Minister and the C-in-C of the Egyptian Armed Forces, other important meetings were held with the current Air Force and Air Defence Commanders. An official tour was arranged to visit the Air Force and Air Defence Headquarters, the Nasser Academy for higher military studies, the Armed Forces Centre for Strategic Studies, and the Air Academy in Bilbase where it was possible to meet other military commanders. Access was also gained to public, private and military libraries and archives, including those of the Nasser Academy, the Armed Forces Centre for Strategic Studies, the Al-Ahram Centre for Strategic and Political Studies, Al-Ahram newspaper and the American University of Cairo (AUC). Official publications and confidential material were thus acquired. The trip also provided the opportunity for a second personal tour of the Suez Canal, Bar-lev strongholds and much of Sinai, including the Sinai Passes - the usual main invasion routes- and I was thereby enabled to gain a direct impression of Egyptian military problems on the ground. Additionally, some interviews were conducted in Britain and Jordan. The above-mentioned interviews and tours provided rich source material, especially on Egyptian perceptions and motives underlying defence strategy.

In short, by using several methods of gathering and analysing information I have been able to outline a range of possible conclusions, yet it must be added that no one method is supported by
sufficient conclusive evidence to allow definitive statements to be made on the basis of it alone. Rather the areas of concurrence between the different methods have been noted and the final conclusions are drawn from these. It is the flexible combination of interviews with officials' accounts, supported by expert opinion, that forms the distinct methodological approach for this thesis.

Main Theses, Themes and Chapter Outline

The study will concentrate on the 1967-1970 period because, as will be shown later, it was during this period that there emerged a new reality in the structure of the Egyptian forces, namely a weak air force and strong air defence. This outcome was not deliberately planned but emerged as a result of a process dictated by many factors. During the following 1971-1973 period, realizing the new reality in their force structure, the Egyptians had to come to terms with the new structure, and this was reflected in their choice of subsequent military strategy. The above mentioned facts dictated the thesis outline. Being the main focus of the study, the 1967-1970 period is discussed at greater length than the 1971-1973 period.

Chapter one reviews Egypt's military strategies before 1967 in the context of its national and regional situation, and provides the background to the ensuing events. The following four chapters then examine the factors which led to the evolution of the air defence strategy by the end of 1970. In exploring those conditions which led Egypt to change its strategy, the study identifies two internal
factors: the conflict within the Armed Forces Command concerning the structure of the Armed Forces following the 1967 defeat; and the time factor, tied to the pressure on the Egyptian leadership to start the War of Attrition. The Israeli response to the War of Attrition and the Soviet role are then identified as the two external factors promoting change.

Chapter two deals with the internal dispute which took the form of Army against Air Force and ended with an Army victory and the establishment of a separate Air Defence Command. The motives and arguments of the commanders during this conflict raise the issues of the Soviet position, the Egyptian justification for establishing a separate Air Defence Command, and what consequences this decision had for the Egyptian Armed Forces. Chapter three examines the circumstances that prevented Egypt from achieving the plan of establishing a strong and capable air force. An examination of Egypt's training capability and the effect of war operations on the training process shows that the plan could not possibly have been realized. This helps in establishing the linkage between the growth of the Air Force and the Air Defence. An analysis of the Egyptian situation at the time shows what consequences the decision to start the War of Attrition had on both Air Force and Air Defence plans.

Chapter four discusses the Israeli role. Close observation of Israeli military tactics during the War of Attrition and the Egyptian responses allows the establishment of a relationship that shows what influence the Israeli tactics had on Egyptian military thinking and
practice. This also brings in the impact of the Israeli deep/raids into Egypt on Egyptian strategy. Chapter five examines the Soviet role. Dependent almost entirely on the USSR for its weaponry and tactics, Egypt seems also to have been influenced in its shift of strategy by the Soviets. Discussing Soviet-Egyptian relations during that period helps to reveal the nature of that influence: how strong it was, and what instruments were used to exercise it.

The following two chapters deal with the 1971-1973 period. Chapter six examines the environment in which the Egyptian command came to recognize the new reality of their force structure and the way they set about formalizing the new strategy. Close observation of the debate inside the Egyptian command during the 1971-1973 period shows what effect the new reality had on its military thinking, and helps to identify the turning point in Egyptian military strategy and explain its motive forces.

Chapter seven discusses the new Egyptian strategy in action and provides a brief assessment of its strengths and weaknesses. The conclusion draws together these various strands into an overall assessment of the process by which the Egyptian air defence strategy developed.

Terminology

After the establishment of a separate Egyptian Air Defence Command in 1968, this command took complete responsibility for ground-based
air defences, but also had air defence fighter aircraft under its operational command. To avoid confusion when discussing ground-based air defence and air defence in general, the following terms will be used: the term Air Defence (beginning with capital letters) will be used to refer to the Air Defence as a service with its responsibility as indicated above; air defence (with small letters) will be used when referring to the ground-based air defence alone; the term fighter defence will be used to refer to the operations of air defence interceptors; and the term air space defence will refer to air defence operations using both air defence elements, ground-based and fighter aircraft.
References

3. For more details on the Suez Campaign, see Armitage and Mason, (1985), pp. 214-223.
7. The books by Heikal and Glassman have been referred to above. The others are Rubinstein, (1977); Sella, (1981); Hussini, (1987).
8. There are two documented examples, the first was that Marshal Amer destroyed documents and maps before his arrest in August 1967, and the second was that important confidential documents were found in General Fawzi's residence upon his arrest in May 1971. On the first example, see Fawzi, (1984), p. 178. On the second example, see Hammad, (1988), pp. 300-301.
9. Most of these are published by the Egyptian Public Department for Information in Cairo.
10. O'Ballance, (1972); Churchill and Churchill, (1972); Kimche and Bawly, (1968); Macleish, (1968); Brigadier Young, (1967).
11. Bondy et al., (1968); Cornfield, (1967); Abu-Lughod, (1970);
Donovan, (1967).

12. See the summary of one hundred books on the October War in Kayyali and Neme, (1976).


15. Examples of Heikal's writings are, *The Road To Ramadan*, (1975); *Sphinx and Commiesar*, (1978); *Li Miser La Li-Abdul-Nasser (For Egypt not for Nasser)*, (1983); *Ind Muftaraq Al-Touroq (At the Cross-Roads)*, (1983); *Bayn As-Sahafa Wa As-Syassah (Press and Politics)*, (1984).


19. Of the published memoirs, three are of particular importance as follows: the memoirs of General Mohammad Fawzi, the Egyptian Minister of War and the C-in-C, 1967-1971, General Abu-El-Izz, Commander of the EAF in 1967, and General Saad El-Shazly, the Egyptian Chief of Staff, 1971-1973. The first two shed much light on the internal struggle for
military reform (i.e., establishing a separate Air Defence Command, and aspects of the Soviet arms-supply policies) and give strikingly contrasting views and justifications regarding the establishment of an Air Defence Command. By contrast, General Shazly concentrates on the planning period (1971-1973) of the 1973 War. He reveals important aspects of the internal debate that followed Egyptian recognition of the existing imbalance in their forces and puts his own arguments forward as to what was the best way for Egypt to fight a war. Fawzi and Shazly's memoirs were referred to earlier. General Madkour Abu-El-Izz; Mudakarat (Memoirs), serialized in Al-Liwa (newspaper), Amman-Jordan, 1987.

20. Shazly, Abu-El-Izz and Ismail have been referred to earlier. Fawzi, (1984); Fawzi, (1986); Sadat, (1978); Ali, (1986); Riad, (1985); Riad, (1986).


22. See for examples the books of Fahmi, Labib and Zeeko, all of which have been referred to earlier.

23. Generally speaking, Egyptian writers can be classified into pro-Nasser and pro-Sadat commentators. The pro-Nasser faction try to justify strategic decisions during Nasser's time, and prove that shifting military strategy towards limited objectives during Sadat's time was a strategic miscalculation, while the pro-Sadat faction vigorously defends Egypt's strategy in the 1973 War. As an example, General Fawzi represents the pro-Nasser group and Jamal Hammad the pro-Sadat group.

24. The best example is found in Fawzi's books: Harb At-Thalath Sanawat (The Three-Year War), (1984); Istratigiyat Al-Mussalaha
(Strategy of Conciliation), (1986); Harb October Aam 1973: Dirassah Wa Dorous (October War 1973: Study and Lessons), (1988).

25. See for example, Farid, (1979).
CHAPTER ONE

EGYPT'S AIR POWER AND WARS, 1932-1967

Historical Background, 1932-1948

The first appearance of aircraft in Middle East skies was their use by the Italians in the Libyan campaign in 1911. After the experience of the First World War, some of the Arab countries' leaderships realized the increasing potential of air power and attempted to field air units. (1) Nevertheless, the introduction of air power in the proper sense - as a third dimension of military forces - to the Middle East countries came through a planned British effort. This was partly a response to pressure by local governments to modernize their forces by forming air forces. (2) These strong wishes and increasing British security interests in the area, in view of the rise of Hitler in Germany and Mussolini in Italy, led to the establishment of air forces in Egypt and Iraq in the early thirties, as well as to the formation of anti-aircraft units later in that decade.

The British authorities agreed to train Egyptians in flying in Britain and at the same time enabled the Egyptian government to acquire ten Tiger Moth aircraft. Upon ending their training, Egyptian pilots were allowed to fly some of these purchased aircraft home, arriving in Cairo on 2 June 1932 (which ever since has been considered Air Force Day). (3) Following that, the Egyptians in 1935 purchased a
squadron of 10 A.V. Roe 626 aircraft and two years later a squadron of Audax aircraft, both of which were British-made combat aircraft. In 1937, a flying school was established using what remained of the Tiger Moth aircraft for basic training, replacing them with Miles Magister aircraft the following year and with the A.V. Roe and Audax for advanced training. Flying instructors were qualified Egyptian and RAF pilots. Naturally, at this time most specialized and advanced training was organized with the RAF in Britain. (4)

The increasing build up of international tension and the general feeling that a war in Europe was becoming imminent in view of the more aggressive moves of the Axis, especially the occupation of Ethiopia by Italy in 1936 which greatly jeopardized British interests in the Middle East, prompted the British decision to strengthen the Egyptian forces. (5) In 1938, the British supplied the EAF with four more squadrons; two of Gloster Gladiator fighter aircraft, one of Westland Lysander ground attack aircraft, and one reconnaissance, light transport squadron of Avro Anson aircraft. In the same year also, the British supplied the Egyptians with three-inch anti-aircraft guns which enabled them to form the first two anti-aircraft regiments, thus establishing the nucleus of the Egyptian air defence. (6)

By and large, the formation and early development of the EAF are attributed to RAF Group Captain Victor H. Tait. (7) Types of aircraft in the EAF inventory at this time tend to indicate that the organization of the force was influenced by the British concept of a Tactical Air Force, a concept which was developed and widely practised
by the RAF in overseas theatres during the Second World War, especially in North Africa.

During World War II, and despite the opening of the North African theatre in which the aim of the Axis forces was to control the Suez Canal, the EAF, as an independent Egyptian force, was never directly involved in combat operations for political reasons. (8) Egypt was not formally involved in the War, although, in defence of Alexandria against Axis aircraft, certain air defence units were activated. (9) The EAF was, however, utilized by the British command in other ways. A squadron of Hurricane aircraft with 25 Egyptian pilots was formed and operated under the British military command in North Africa. Its main role was to provide air cover for Allied ships cruising between Saloum and Alexandria on the Mediterranean. Furthermore, a small number of Egyptian pilots were attached to British commands and assigned the duty of ferrying aircraft from the combat zone to rear maintenance areas. (10)

The participation of the EAF and air defence Units with the Allies during the war, though limited, provided the Egyptians with some combat experience and improved their standards. At the end of the War, the British forces handed the Egyptians the Hurricane squadron already mentioned and a squadron of Spitfire fighter aircraft. Moreover, the American forces which operated from Cairo airport left behind about 100 transport aircraft, mainly C-47 Dakotas and C-46 Commandos, among which twenty were made serviceable for flying. (11) Despite this unexpected gift to the EAF at the end of the war, declining British
interest in the region immediately after the war had an impact on the
EAF. Lack of spare parts coupled with poor maintenance resulted in
diminished serviceability of these aircraft. By the end of 1947,
fifteen years after the EAF's establishment, only four Lysander, 12
Hurricane and 18 Spitfire aircraft were operational from among the
combat aircraft. (12)

The 1948 War

The Arab Armies moved into Palestine on 15 May 1948, the day set by
the British government for the official termination of its mandate
over that country, starting the first round of the Arab-Israeli wars.
This war lasted until 13 March 1949, during which two unsuccessful
truces were sponsored by the United Nations. (13) The 1948 War was the
first real combat experience of the EAF. At the start of the
operations, the EAF dominated the sky over the battlefield and was
able to perform all the traditional roles of tactical air power. In
the first phase of the war, meeting no opposition in the air, the EAF
was mainly used for close air support, counter-air and interdiction
missions. The EAF attacked Israeli air-fields on 15, 16 and 17 May and
on 3 June 1948, while Egyptian aircraft were sent to attack targets
before the advancing Egyptian Army, most of which were settlements.
Targets in Tel Aviv and the surroundings such as the main port,
military camps and airport were also repeatedly attacked. (14)

In general, during the first phase of the 1948 War, the Egyptians
enjoyed air superiority over the Israelis, yet could not decisively
alter the outcome of the battles. There were several reasons for this. First, despite the fact that the air balance was in its favour, the EAF was too small to inflict heavy, decisive losses. This was particularly true in view of the limited payload of EAF aircraft and the lack of aiming devices compared to modern types of aircraft. Second, given the fact that the Egyptians had limited airfields and facilities in Sinai, with the only main air base being Al-Arish, they could not risk deploying more than a part of their force in a single forward base. As a result, the Egyptian air attacks were not carried out in strength and were unable to inflict heavier damage on a target in a single attack, or to overwhelm the few anti-aircraft weapons employed by the Israelis, which managed to score some kills. The Egyptian problem of air strength was exacerbated only a week after the war broke out, when the RAF shot down five out of the eight Egyptian Spitfires based at the Al-Arish base. (15) Third, the EAF interdiction effort in this phase seems to have been ineffective. Since the kind of targets selected for attacks were not directly connected to the Israeli war effort and because attacks were not carried out in strength or in a sustained fashion, their effect on the battlefield was delayed and there was little practical effect on the Israelis.

Earlier, in October 1947, the Chairman of the Jewish Agency David Ben-Gurion received an allocation of three million dollars from the Jewish Agency Executive for the purchase of weapons with special attention to the purchase of aircraft. (16) A task team was formed and assigned to purchase weapons by all means. By the end of 1948, the clandestine purchasing network masterminded by Ben-Gurion had brought
205 aircraft into Palestine (out of 250 aircraft purchased in Europe and America). There were also volunteer pilots from overseas, both Jews and non-Jews. (17)

When the fighting resumed upon the expiry of the first ceasefire, on 8 July 1948, the impressive Israeli build up of air strength started to show. The air situation changed gradually in Israel's favour when it launched its Spitfires, Messerschmitt 109s and B-17 Bombers into the skies. (18) Israeli aircraft started to challenge the EAF and to attack Egyptian troops. Of far greater psychological importance were the raids against Arab capitals: Cairo, Damascus and Amman. (19) During the second phase of the war, neither side could intercept each other's aircraft since they had no proper radar coverage, but at the start of their major offensive in the Negev (Operation Yoav) on 15 October 1948, the Israelis attacked Egyptian airfields in Sinai and inflicted heavy losses on the main base at Al-Arish. (20) The Egyptian Air Force was knocked out of action and the Israelis retained air superiority over the battlefield for the rest of the war.

At a general level, three things can be said about the Egyptian Air Force in 1948. First, Egyptian intelligence was so poor that they did not know that Israel had acquired combat aircraft and so their appearance on the battlefield came as a surprise, as did the Israelis' first raid on Cairo. (21) Had the Egyptians known the significant numbers of smuggled aircraft and their main assembly areas, the EAF might have been capable of mounting a devastating blow against the few
crowded Israeli airfields. Furthermore, had they monitored the growing air potential of Israel at the time, the disastrous effect of the Israeli strikes on Sinai airfields could have been minimized. Second, there was no real war planning and adequate preparation of the theatre for air power use. The Egyptian decision to join in the war offered no warning time for preparation and no real effort was made to compensate for losses or to improve the spares inventory. All important strategic decisions seem to have been dictated by the personal political ambitions of the Egyptian leadership. (22) Third, the experience of the veteran Second World War pilots fighting with the Israelis proved decisive in influencing the outcome of air combat in the 1948 War. The American, British and South African pilots who had accumulated experience during World War II proved superior in tactics and in air combat. The latter skill was not only demonstrated against the Egyptians but also against the RAF in the Canal Zone when Israeli aircraft shot down five RAF aircraft in air combat on 7 January 1949. (23)

The Suez War (1956)

In September 1955, Egypt announced that it had signed an arms supply agreement with Czechoslovakia. (24) This related mainly to tanks, aircraft and anti-aircraft weapons of Soviet make. At that time, all Egyptian air defence weapons were western-made and the EAF was dependent on British fighter aircraft; it had a total of 60 Meteors and Vampires received in 1949. (25) To form new squadrons of MIG 15s and MIG-17s, according to the new Egyptian plan, required
utilizing the pilots as well as the ground crews trained on British aircraft. In any case, by the start of the Suez Campaign and within about a year of signing the arms contract, Egypt was able to form one squadron each of MiG-15s and MiG-17s and two squadrons of Il-28 bombers, but training on these Soviet aircraft started only a few months before the start of operations in October 1956. (26)

According to the Anglo-French invasion plan to seize the Suez Canal (Operation Musketeer), to which the Israeli offensive was linked, the task of attacking the EAF was left to the British and the French. The role of the IAF was limited to close support, interdiction strikes against communication centres in the rear, and battlefield air cover. The Israeli air space defence was reinforced by the deployment of French squadrons inside Israel for the task. (27) The Israelis appear to have intended to avoid deep strikes so as not to provoke the Egyptians into retaliation against heavily populated centres inside Israel. (28)

At the start of the Israeli offensive, however, the EAF was introduced to the battlefield for ground attack missions. The Egyptians flew about 40 sorties in the first day of the war, on 30 October 1956, and 90 on the following day. (29) At first, air battles took place between the Egyptian Vampires and the Israeli Mysteres with the results being in the Israeli favour. The Egyptians then developed the tactic of sending the Vampires for ground attacks accompanied by the MiG-15 to provide top cover, but with no better results. (30) During the first phase, about 14 air battles took place in which the
Egyptians lost four MiG-15s and four Vampires, for no loss to the Israelis. (31) The Egyptians also used the Il-28 bombers in night attacks against Israeli airfields, but with little effect. (32)

In the evening of 31 October, the Anglo-French attacks started against four of the seven major Egyptian airfields, Almaza and Inchas near Cairo, and Abu Sueir and Kabrit in the Canal Zone. Next morning, British and French aircraft followed up against the airfields. By the end of the day, the Allies had flown a total of 496 sorties. (33) At this point, the Egyptian leadership decided to avoid throwing the EAF into battle against the British and French Air Forces. (34) The Allied attacks during that day and the following night against major Egyptian airfields met no real opposition. (35) Although many Egyptian aircraft were destroyed or damaged on the ground, others were dispersed and flown out to remote bases. All Egyptian airfields, however, stayed serviceable for operations. (36)

The Egyptian decision to refrain from using the Air Force, depending instead on their ground-based air defences, aimed at saving pilots from what was seen as a lost battle against the Allied forces. The decision was based on the following factors: first, although some of the Allied fighter-bombers were obsolete (such as the Venoms) most were modern jet aircraft. Besides the numerical superiority of these aircraft, Allied pilots had long experience. On the other hand, Egyptian jet aircraft were newly introduced, in fewer numbers, and flown by less experienced pilots - which meant limited utilization of the machines. (37) Second, despite the lack of precision in the attacks
of the Allied fighter-bombers, their use of delayed-fuse bombs restricted movements inside the airfields. (38) Third, the Egyptians judged that saving their pilots' lives in this situation was absolutely necessary, since Soviet aircraft deliveries were often not completed for lack of trained pilots and because, in their view, replacing aircraft would be easier and faster than replacing fighter pilots. (39)

The Allied attack tactics in their counter-air phase followed an old British practice of attacking airfields at night using medium and heavy bombers, followed up by attacks at dawn by fighters and fighter-bombers. As such, the preliminary strikes gave a clear warning of impending follow-up attacks, thus losing the element of surprise. Moreover, applying the old British tactics of area-bombing required a large number of bombers dropping huge amounts of ammunition over the airfields with a relatively low probability of hitting any target precisely. This was indicated by the failure to hit sensitive targets inside the airfields such as the runways, enabling the Egyptians to continue operating from those airfields attacked. (40)

As far as the Egyptian forces are concerned a few points emerge. First, the Anglo-French campaign caught the Egyptians in the middle of a transition period. The Soviet weapons and aircraft had been introduced a few months before the war, which did not allow time to accumulate experience on them. Equally important was that the Egyptians were also caught at the start of a change of air doctrines, from the British model to a Soviet one. (41) The Egyptian decision not
to introduce the MiG-17s into the fighting, despite having already set up the first squadron, supports this view. (42) Secondly, had the Egyptians not decided to refrain from using the Air Force and had they utilized the undamaged airfields to launch daring attacks against the Allied aircraft carriers and the three crowded airfields in Cyprus, the war could have taken a different course, though probably not affecting the outcome. Armitage and Mason believe that 'it was fortunate that the Egyptian Air Force was incapable of exploiting the serious inadequacies of the Allied counter-air offensive'. (43) Third, the performance of Egyptian air defences was mixed. In Sinai, they shot down 10 Israeli aircraft - one Mystere, seven Mustangs and two Harvards. (44) They did not, however, perform as well during the intensive day and night attacks by the Allied bomber force against the airfields. The Allied forces lost only five or six aircraft, mainly to anti-aircraft guns, during the whole campaign. (45)

The conclusions drawn by the Israelis from this campaign were of extreme significance for future wars. Principal among these was that Israel lacked intelligence information about the EAF in general and about the effectiveness of the new Soviet fighter aircraft. The Israeli shortcomings in this context led to reliance on the Anglo-French forces for neutralizing the EAF. The exaggerated Israeli assessment of the EAF potential also led to a request for French assistance in defending the depth of Israel. By the end of the 1956 operations, Israel realized that in fact it could have been capable of challenging the EAF by itself. (46) This lesson led Israel to focus on developing the air intelligence branch. The second lesson was of a
political nature; that is, the necessity to guarantee American support as a prerequisite to any future launching of military operations, so as not to be faced with similar pressure to that which had forced the Anglo-French forces to withdraw from Egypt. (47) Finally, of highest importance was the lesson that, to be able to achieve a devastating result in the opening stages of counter-air operations, complete utilization of the element of surprise must be emphasized. The first attack should be in strength, covering most bases simultaneously and using precision attack methods.

The Aftermath of Suez

An immediate lesson drawn by the Egyptian leadership from the Suez campaign of 1956 was that big power intervention on the Israeli side in any future confrontation was a probability. In this case, knocking out the EAF would be a priority at the start of any land operations. (48) The Egyptian leadership's evaluation was that Egypt could not have military forces capable of standing against joint invading forces on the 1956 scale. (49) Therefore, it perceived that Egypt's Armed Forces should be able actively to defend Egypt's borders against an Israeli aggression, and to delay any big power forces from achieving their targets until the expected international reactions could be brought to bear. (50) According to this new Egyptian strategy, it was necessary to expand the size of the Armed Forces and to modernize their weapons to enable them to play all envisaged roles. (51)
The Suez campaign had a direct negative impact on the higher political and military command that was reflected in the Armed Forces as a whole and that, moreover, prevented the lessons learnt from this experience being translated into practice. Ironically, Nasser's diplomatic success in obtaining the support of the two superpowers and their stand against the Anglo-French invasions, obscured the reality of the Egyptian military defeat. (52) Moreover, his earlier popular achievements (such as the British evacuation agreement, breaking the western arms monopoly in the area, and nationalizing the Suez Canal) had all reinforced his personalized style of leadership. The political success achieved in the Suez campaign encouraged further concentration of decision-making in the hands of Nasser and a small elite. (53) Most acutely affected was the EAF; under the command of officers chosen for their loyalty to the top leadership, hard training was overlooked and actual fighting capability was downgraded. (54)

Another event which had negative effects on the Egyptian Armed Forces was the Yemen Campaign. Political developments in the region led to the Egyptian military intervention in Yemen in support of the new military regime in 1962. This involvement gradually increased to consume more forces and resources, and had a growing impact on the objectives, structure, and operational standards of the Armed Forces. (55) The kind of enemy these forces had to fight was tribal groups in the mountains, which did not have heavy weapons or anti-aircraft systems, let alone an air force. Consequently, most Egyptian operations involved small-scale raids by small units. The EAF met no opposition, from air or ground-based weapons. Intervention in Yemen
also halted annual training, partly for lack of funds and partly under the excuse of gaining combat experience (that was, however, of no conventional military value). In addition, in these kind of operations Egyptian forces ignored military discipline, which further decreased performance. (56) Most important was that this Egyptian involvement in Yemen took priority over the Arab-Israeli conflict, reducing preparation and readiness in Sinai. (57) Some 33 percent of the entire strength of the Egyptian Armed Forces was tied down in Yemen, while larger numbers were diverted to internal security duties at home. (58)

On the positive side, Egypt started to acquire increased numbers of modern weapons from the Eastern bloc countries to meet its new defence requirements after the Suez Campaign. Here too, however, the Yemen campaign had a negative effect, as it encouraged acquisition of greater numbers of such items as bombers and transport aircraft, which were unsuited to the Sinai theatre. Egypt also attempted to produce some of its requirement locally. In this effort, the Egyptians focused on developing the capability to assemble jet aircraft and surface-to-surface missiles. (59) They also started to form the nucleus of a modern air defence system in 1960, when they acquired five radar systems to provide early warning and to control fighter interceptor aircraft. (60)

The 1967 War

On receiving reports that Israel had massed its forces on the Syrian borders in April and May 1967, possibly to retaliate for
Palestinian infiltration, Egypt moved forces into Sinai. Egyptian force movements were made openly and announced with the aim of warning Israel (a similar demonstration had succeeded in causing Israel to back down in 1960). (61) On 16 May 1967, in order to appear more determined and to give the deterrent effect more credibility, Egypt requested the withdrawal of the UN troops deployed along the Egyptian-Israeli frontier. The next day, in a surprise move the UN Secretary General, U Thant, announced that the force was being withdrawn, without prior consultation with the Security Council. (62) The Egyptian forces moved into the key fort of Sharm el-Sheikh overlooking the Straits of Tiran. Six days later the Gulf of Aqaba was closed to Israeli ships. The following day Israel announced that any interference with shipping would be considered an act of war. (63)

By 1967, Egyptian military strategy was purely defensive. The only readily available plan for operations was the 'Qaher' defensive plan which had been modified and prepared the previous year. (64) Upon the start of the escalation in May 1967, Egyptian troops were deployed in Sinai according to this plan. It aimed at preventing Israeli forces from penetrating Egyptian defensive lines and reaching the Suez Canal. Egyptian units should destroy Israeli forces which succeeded in penetrating defensive positions, and should prepare for launching a counter attack. In essence, the Egyptian concept of defence was based on the idea of allowing large Israeli formations to be committed in launching offensive operations, in order that heavy losses might be inflicted on them by the defending Egyptian forces which would then turn to offensive operations. The Egyptian Air Force plan (code-named
Fahad'), which was tied to the general plan 'Qaher', was mainly for ground support and reconnaissance. Realizing the seriousness of the situation during the second half of May, the Egyptian military command hastily ordered the preparation of small-scale offensive plans. The 'Fajer' offensive plan against the southern part of the Negev aimed at occupying the port of Eilat was outlined only on 18 May 1967. Accordingly, the Air Force sketched the 'Assad' plan to launch an opening strike against Israeli targets including airfields, radars and concentration of troops in order to be able to provide air cover for the attacking Egyptian forces. Nevertheless, final details of these plans were not completed by the start of the war. (65)

Egyptian air doctrine was dependent mainly on the Air Force for achieving tactical air superiority as well as performing other traditional missions such as ground support and reconnaissance. The Air Force was expected to fight for a limited air superiority through counter-air missions against enemy airfields, as well as through inflicting losses on enemy aircraft in air combat. There is little evidence, however, that the Egyptian Air Force was contemplating fighting for strategic air superiority. During Nasser's meeting with military commanders on 2 June 1967, three days before the outbreak of war, the Air Force Commander, General Sodki did argue in favour of an Egyptian pre-emptive strike, but General Sodki's request to launch a first strike was probably based on the limited offensive plan 'Fajer' and its Air Force derivative 'Assad', and not on an overall pre-emptive strike. (66) The fact that the Egyptian Armed Forces, including
the Air Force, had no major offensive plan by that time strongly supports this view.

The role of ground-based air defence was limited to providing local cover by harassing attacking aircraft and preventing them from achieving successful attacks. In providing cover for troops, air defence was thought to be effective in defensive situations, while, because of lack of mobility and lower combat survivability, air defence weapons were not thought to substitute for the Air Force in providing air cover for field troops in manoeuvre battles. Nevertheless, the Egyptian command seems to have over-estimated the effectiveness of air defence weapons even in point and area defence. That the Egyptian military command decided to give away the initiative in military operations to the Israelis, and that it anticipated losses of only 20 percent in the Air Force to an enemy first strike, suggest that air defences were thought to be effective in defending airfields. (67) In general, the placing of air defences under Air Force Command indicates that their role was thought to be complementary to that of the Air Force in air space defence.

By the beginning of 1967, EAF strength consisted of 30 Tu-16 medium bombers, 40 Il-28 light bombers, 130 MiG-21 fighter aircraft, 80 MiG-19 all weather fighters, 15 Su-7 ground attack aircraft and 150 MiG-15 and MiG-17 fighter bombers. (68) Fawzi asserts that Egypt had only 200 serviceable aircraft (out of 260) and 150 pilots, whereas as many as 74 MiG-21s and Su-7s were in storage because of pilot shortages. (69) Though used as fighter-bombers the MiG-15s and 17s had only limited
range. The larger number was of MiG-19 and 21 all weather fighters and interceptors, primarily used for fighter defence. The bombers were of symbolic deterrent value rather than being effective offensive weapons. Their large size and slow speed rendered them vulnerable both to Israeli interceptors and to Hawk missiles. Moreover, area-bombing had been proven ineffective during the 1956 campaign, and the Egyptian bombers lacked air protection due to the shorter range of the fighter escorts. The fact that the Soviets supplied the Egyptians with MiG-21 interceptors in quantities several times greater than the number of specialized Su-7 ground attack aircraft (an estimated one hundred and thirty as against fifteen), shows the defence-oriented structure of the Egyptian Air Force.

For its part, the Egyptian air defence system consisted of about 55 battalions of anti-aircraft artillery, most of which were equipped with 37, 57 and 100mm calibre Soviet guns, in addition to the organic combat formation air defence battalions. The number of the latter is not known for certain, but given that, at the beginning of 1967, Egypt had 25 armour and infantry brigades, standard support ratios would suggest there were a further eight to nine air defence battalions. All these weapons were towed, and therefore of less value for armoured formations on the move. Another 29 companies equipped with 14.5mm heavy anti-aircraft machine guns were deployed mainly around airfields. The 27 SAM-1 and SAM-2 battalions were located in five main areas: nine battalions in the Canal area three of which were located five to fifteen Km east of the Canal; nine around Cairo; three around Alexandria; three east and north of the Delta; and three around
Aswan. (73) With the exception of the anti-aircraft machine guns, none of these weapons were effective against very low-level targets. The kill probability of the machine guns was much less than originally thought because of the improvement in airframes that enabled them to absorb more punishment.

In the morning of 5 June 1967, Israel launched an all out offensive in Sinai and at the same time directed a devastating blow at the Egyptian Air Force. At 0845 (Cairo time), the first wave of Israeli aircraft struck at 10 Egyptian main air bases. Ten minutes after completing the attack came a second wave, followed by a third. At 1050, the Israeli Air Force Headquarters reported to the General Staff that the backbone of the Egyptian Air Force, the MiG-21 squadrons, had been wiped out. Although only second line MiG-17 fighter-bombers were deployed in the Sinai bases, four of them were included as targets for the first Israeli attacking wave because of their proximity to Israel. (74)

In each case the air attack followed the same pattern. The fighter-bombers (Vautours) attacked first to put the runways out of action using delayed-action bombs. (75) After that, the top-cover fighters attacked Egyptian aircraft on the runway or near it. The Israeli attacking force followed a specific priorities; the super-sonic fighters were attacked first, other combat aircraft came second followed by the transport aircraft. Bombs were used against the runways and the hangars, whereas the aircraft on the ground were attacked by rockets and cannons.
Most Egyptian fighters were destroyed in the first round of air attacks, but seven Egyptian air bases remained intact, and with them the bomber force. At 1330 this force was also destroyed during the second round of air attacks. (76) In the first day of the war, the Egyptians lost 122 supersonic fighters, 75 subsonic fighters, 27 Il-28 light-bombers, 30 Tu-16 medium bombers and 32 transports and helicopters. (77) While secondary Egyptian air bases were under attack, the Jordanians and the Iraqis, ignorant of the real results of the Israeli attacks, attempted to attack targets in Israel. While Jordanian aircraft attacked one airfield (destroying a transport aircraft), the Iraqi bombers attacked a seaside resort and a village. Between 1300 and 1545, five Syrian, two Jordanian and one Iraqi air bases were attacked by the IAF. This was enough to eliminate the Air Forces of Syria and Jordan.

Once the Arab Air Forces had been neutralized the IAF’s main function was to support the ground forces. Achieving air superiority in that manner on 5 June 1967 contributed significantly to the Israeli victory on the ground; without it, the outcome would not have been the same, at least in terms of war duration and Israeli casualties. Air superiority meant that all Israeli serviceable aircraft could be put to use, including those which could not survive in air combat; obsolete fighter-bombers, transports and armed trainers could be used without fear of enemy air intervention and without need of fighters for top cover. Israeli ground forces could speed up and advance in convoys without being exposed to air attacks, while IAF aircraft attacked the Arab ground forces on the battlefield disrupting their...
line of retreat. By performing thus, air power helped the Israeli advance and paved the way for the Israeli victory in 1967.

No doubt the combined effect of Israeli detailed planning, excellent execution and good intelligence determined the outcome of the 5 June air strike, but the Egyptian lack of foresight and miscalculations on both the political and the military levels coupled with the lack of preparation and the low operational standard of their forces played a major role in facilitating the IAF's spectacular performance. In this context, several points on the Egyptian side are worth more illustration:

I. Although the Egyptian leadership correctly anticipated the timing of the Israeli attack (see below), the early warning system failed to provide any warning although it was not attacked till later in the afternoon of 5 June 1967. It has been suggested that the Israelis may have used Electronic Countermeasures. (78) In fact this does not appear plausible, and can be refuted on several grounds. First, to blind Egyptian radars by using ECM immediately before an air strike could be counter-productive by alerting the Egyptians to the impending attack (and possibly its direction). Had the Israelis used ECM, they could probably have masked the size of the attack, but most likely, this would have warned the defenders. Second, had the Israelis planned to use ECM against the Egyptian radar network, there was no guarantee that other neighbouring Arab radars or Soviet ships' radars would not provide warning to the Egyptians. This required, therefore, that Israel blind all radars within effective range. The fact that Israel
did not use any ECM techniques against the famous Marconi long-range radar in Ajloun-Jordan, which arguably could have passed warning to the Egyptians, further supports the idea that Israel did not use ECM generally. (79) The Ajloun radar was attacked at the same time as Jordanian air bases about 1300 on 5 June. Third, there has been no confirmation from any official source of either side of the use of ECM against radar networks. What is certain is that Israeli aircraft flew at low level from over the Mediterranean to evade detection by Egyptian radars, with the result that the Egyptian early warning system failed to detect Israeli aircraft. This failure, in turn, is best explained by the fact that Egyptian radars were not sited or used effectively. This was a glaring fault, as the Egyptians had concluded from the 1956 experience that an attack from the north (over the Mediterranean) was a real potential threat, and so radar coverage of this route was a basic military requirement. Nasser's explanation that Egypt was taken by surprise because it had expected an attack from the east was for local consumption and aimed at supporting his claim that UK and USA forces assisted in the Israeli air attack. (80)

2. In Nasser's evaluation of the situation during his meeting with Egyptian top commanders on 2 June 1967, he warned that Israel might strike against the EAF between the 3rd and the 5th of June 1967, with the latter date being the most probable. (81) Nasser explained that for political reasons Egyptian forces should be able to absorb the first attack before retaliating. Nevertheless, the actions of the Egyptian military command suggest that it had never accepted the evaluation of the political command, that Israel would soon have to attack Egypt.
Combat aircraft were not dispersed inside the air bases, and remote airfields (apart from the Sinai bases) were not activated. Rather, Egyptian aircraft in the main bases were neatly aligned in the open as in an air show demonstration. (82) Furthermore, there were no round-the-clock air patrols as a military precaution. Instead, the Egyptians were satisfied with several flights of MiG-21s waiting at the end of runways on five-minutes alert at dawn, after which their state of alert was lessened. (83) 

Belittling the threat, and despite Nasser's warning, Marshal Amer, the Egyptian C-in-C, accompanied by the EAF Commander, General Sodki, chose June 5 to inspect troops and air bases in Sinai - indeed all senior Egyptian commanders gathered in Bir Tamada air base at 0900 to meet the visitors, whose aircraft could not land because the airfield was itself under attack. Ironically, in arranging for the safety of the Marshal's flight, the Egyptian command had put most air defence weapons on a guns-tight state. (84) It is not certain whether Israel knew about this visit in advance and took advantage of it to launch its strike at a time to catch the top military commanders while in the air. Peace-time procedures and behaviour inside the Egyptian air bases did not change to a war-time posture although they were on a high state of alert, and office work and training courses started as usual at 0900. The Israeli timing of the attack (0845) aimed at catching commanders on their way to their offices and pilots on their way to training courses. (85)
3. Most sources confirm that the EAF Commander, General Sodki, argued in favour of launching a first strike against the IAF, during Nasser’s meeting with top military and political leaders on 2 June 1967. (86) In the course of the discussion, it became clear that, for political reasons, Egypt could not start military operations; instead Egypt had to absorb the first strike if it came and then retaliate. At this point, the Egyptian Air Force Commander judged (in one among many mistaken judgements) that the first Israeli strike against the EAF would not cause damage to more than 20 percent of Egyptian air strength. (87) This estimate seems to have been based on past experience, particularly that of 1956. It also indicated that the Egyptian command was not aware of the development in Israeli weaponry and tactics, namely, the development of runway bombs and the pin-point bombing technique. What also made this estimate far from being realistic was the fact that most Egyptian airfields had single runways, while the rest had two crossed runways which offered the attacker an opportunity to put the two out of action by hitting one point (their intersection). In addition, Egyptian fighters were placed in the open, for they had no shelters at that time.

4. Nasser’s claim over Cairo Radio, on 6 June 1967, that British and American aircraft had intervened on behalf of Israel may have reflected the initial perception that the sudden strong Israeli attack on the air bases was only a preliminary attack in a wider scale invasion by a joint force of the UK, USA and Israel. This explains the state of confusion within the Egyptian command, which led to the issuing of an order for the withdrawal of the Egyptian forces in Sinai
on the second day of the war. (88) This order was given at a time when
most Egyptian units were not yet engaged with enemy forces, and led to
loss of control over Egyptian forces. The pattern here was similar to
that in 1956, once the Egyptian command had realized that the British
and the French forces were part of the campaign — then too, an order
to withdraw from Sinai was issued. The Israeli use of multiple
sorties, suggesting a number of aircraft beyond Israeli strength,
possibly reinforced the Egyptian misperception and fears of a British
and American role in the opening strike of 5 June 1967. (89)
Heightening Egyptian fears was the fact that the route taken by
Israeli fighters to attack their targets was the same as that expected
from Western forces attacking Egypt from Mediterranean bases such as
Cyprus, Malta, or from aircraft carriers. Activity by both British and
American reconnaissance aircraft in the area, and the coincidental
movement of the Lightning F.6s of No. 74 Squadron RAF (supported by 17
Victor tankers) from Leuchars in Scotland to Singapore on 4th, 5th and
6th June, probably confused the picture even further. (90)

5. Although Egypt, Syria and Jordan had signed a joint defence treaty
in May 1967 and set up the symbolic Arab Higher Military Command in
1964, they had not achieved even a minimum level of coordination. The
most striking example was the delay in the reaction of Egypt's Allies
against Israel during the attack on Egyptian air bases: according to
Israeli sources, only about 12 fighters were left to defend Israeli
skies during the launching of the initial strike on Egypt. (91) One
wonders what the result would have been if, during that time, the
Syrian, Iraqi and Jordanian Air Forces had launched a concerted attack
against Israeli air bases, with Israeli aircraft returning from Egypt short of ammunition and fuel for air combat. Instead, the Jordanian and Iraqi attempts lacked strength and came too late to be effective.

6. Finally, whereas the Egyptian Air Force was not even given the chance to demonstrate its performance apart from individualistic attempts, the Egyptian air defence performance was disappointing in view of the number of Israeli sorties and the results achieved. On the first day of the war, Israeli pilots flew about 1000 sorties against some 25 Arab air bases, destroying over 400 aircraft on the ground for the loss of 20 Israeli ones. By the end of the war admitted Israeli losses only amounted to 46 on all fronts. Although all but three of these were to ground fire, none of these losses was attributed to the 138 SAM-2 missiles which Egypt possessed at the time. (92)

Many factors contributed to the poor performance of the Egyptian air defence. First, most of the crews of the anti-aircraft systems were reservists, who lacked training and discipline. (93) Second, the communications system which linked the Air Force Command with its dispersed air defence units was technically poor and lacked a back-up system. Once communication failed, the whole command and control system collapsed. Egyptian anti-aircraft units were left on autonomous control, but the absence of effective command by junior officers at the local level led to poor performance. General Fawzi notes that the reaction of air defence units was confused because of the state of shock of the crews. He records that the Prime Minister of Iraq and the Egyptian Vice-President, who landed at Abu-Sueir air base (in the Canal Zone) two minutes before its destruction, noticed that not a
single shot was fired at attacking Israeli aircraft by the surrounding
air defence units. (94) Although Egyptian anti-aircraft units between
Cairo and Sinai were put on a guns-tight state between 0800 and 0900
on 5 June 1967 for the safety of the C-in-C, regulations did not
preclude self-defence. There appears to be no explanation for the lack
of self-defence besides ignorance and shock. And finally, the Israeli
tactic of attacking AA batteries with air-burst bombs may have added
to the losses and confusion in the local command and control of the AA
batteries. (95)
References

1. The Hashemite Sharif of Mecca, Hussein Ben Ali, in Hijaz (now part of Saudi Arabia) established a military school in 1916. After the First World War a pilot training programme was conducted as part of the military training under the supervision of German instructors, but soon after the graduation of the first batch the programme was abandoned. This information, supported by diplomas issued to the graduated pilots, was provided by Hassan El Madani, graduate of the first batch of pilots, in an interview, Amman, 18 March 1983.


5. For British views on the tension with Italy and the danger it posed to their interests in Egypt and Sudan see, for example, the telegram of Sir M. Lampson, the British High Commissioner in Cairo, to the Foreign Office dated 30 April 1936, in the Public Record Office, registry number J3721/35/16. On the proposal for the modernization of
the Egyptian forces in view of the increased tension, see the letter of the High Commissioner to the Foreign Office dated 6 January 1936, in the Public Record Office, registry number J403/35/16.


8. In June 1940, the Egyptian Parliament voted against declaring war on the Axis countries unless they attacked Egypt. Moreover, the Egyptian government contemplated declaring Cairo an open city, but this wish was resisted by the British authorities. Interestingly enough, the Egyptian Parliament's decision was taken despite the fact that Italian aircraft had already attacked Egyptian military positions in Mursa Matrouh and killed some Egyptians. Furthermore, the subsequent Italian attack on Egypt's western borders on 10 September 1940 did not change Egypt's position. Ismail, (1987), pp. 22-23; Labib, (1977), p. 34. On British views, see the telegram of Sir Miles Lampson, the British High Commissioner in Cairo, to the War Cabinet dated 5 August 1940. Public Record Office, registry number J/1562/1562/16.


10. On the British proposal to form a fighter squadron for the protection of Middle East convoys, see the letters from the High


12. Ibid., p. 40.

13. The first lasted from 11 June to 8 July 1948, and the second started on 18 July 1948, but was never observed on all fronts until the end of the war.


15. Five Egyptian Spitfires based in Al-Arish were on a mission to attack Ramat David air base in Palestine on 22 May 1948. These aircraft were ambushed by RAF fighters which still remained in that base. Only one Egyptian pilot survived and was taken prisoner of war. For the full story of this incident see Labib, (1977), pp. 54-55; Dupuy, (1978), p. 112. The Egyptian authorities apologized for the attack by Egyptian Spitfires on British troops. See the letter from the High Commissioner to the Foreign Office. Public Record Office, registry number J/3452/8/16.


22. The Egyptian decision to join in the 1948 War was taken only three days before the start of operations in Palestine on 15 May 1948. For more details on the responsibility of King Farouk and the palace men for the Egyptian military defeat, see Ismail, (1987), pp. 34-35. On the battlefield decisions, see El-Badri, (1976), pp. 51-53, 289-292.

23. At this early stage of the IAF, foreign volunteers provided much of the trained manpower of the Air Force. Luttwak and Horowitz, (1975), p. 65. In the air battle, four Spitfires and one Tempest RAF aircraft were shot down by Israeli aircraft. See H. M. G's statement on the shooting down of five RAF planes on the Egyptian-Palestine frontier. Public Record Office, registry number E/386/1223/31. For an Israeli account, see Israeli reports of RAF reconnaissance flights over Israeli lines. Public Record Office, registry number E/111/1091/31. For the exact location of the attack, names and fate of captured and killed RAF personnel, see file 1223/31 in the Public Record Office, registry numbers E/466/E467/E533/E729/E1028/E1158/1223/31. Also, on the story of the air battle with the RAF aircraft, see Schiff, 'The Israeli Air Force Story', Air Force Magazine, August 1976, p. 32; Dupuy, (1978), p. 112.


26. On the EAF strength on the eve of the 1956 campaign see Dupuy,
(1978), pp. 147, 212; Labib, (1977), p. 106. According to Dayan the
number of MiGs Egypt had received by the start of the 1956 War was
200. He estimated that four squadrons could be operational. Dayan,
34. In fact, apart from a few unsuccessful attempts to intercept
British and French attacking aircraft the Allied forces met with no
challenge. The Egyptian decision was taken on 1 November 1956. Labib,
35. The losses of the attacking Allied aircraft were estimated at five
36. The estimates of Egyptian losses vary significantly. Armitage and
Mason estimate that about sixty aircraft were destroyed on the ground
while Dupuy estimates that about 200 aircraft were destroyed on the
runway serviceability, see Armitage and Mason, (1985), p. 219; Labib,
38. Ibid.
39. Glassman notes that the Egyptian decision to evacuate the Il-28
bombers from Egypt to Syria via Saudi Arabia could have been partly motivated by the Soviet desire to avoid their destruction or capture. Glassman, (1977), p. 19.

40. Although the results of the Anglo-French bombing were disappointing in terms of putting runways out of action, it seems that the actual number of damaged Egyptian aircraft was more than it originally was thought to be. It is implied in later Egyptian writings that the EAF was almost completely destroyed, suggesting that Dupuy's estimate (200) is more realistic. For Egyptian writings, see Ismail, (1987), p. 68; Shazly, (1980), p. 19.


42. Egyptian sources confirmed that the MiG-17 aircraft was in Egypt at the start of the campaign. Labib, (1977), p. 106.


47. This view was implied in Dayan's memoirs on the 1956 campaign. Dayan, (1965), p. 192.

48. Ismail, (1987), pp. 57-58, 69-70. According to Ismail, before the 1956 campaign, there were two different evaluations. The political command judged that an Anglo-French military involvement against Egypt was improbable, whereas the military command evaluation was that this intervention was a probability. The latter view was implied in the directive issued by the Egyptian General Headquarters on 16 September.
1956.

49. This is evident in the Egyptian military decisions during the 1956 War: Egypt's reluctance to use its Air Force and the decision to evacuate Sinai. It is also evident in Nasser's resistance to Syrian and Jordanian requests to join in the War. On Nasser's views on this point, see Ismail, (1987), p. 62.


52. This view is shared by many Egyptians. For example, see Abu-Zikra, (1988), p. 41; Labib, (1977), pp. 116-118.

53. For examples of this new attitude, see Abu-Zikra, (1988), pp. 37-135. This was also confirmed by Fawzi. Fawzi, (1984), pp. 40-45, 52-53.


57. This view is supported by the conclusion of Dr. Nafe'a's study on

58. According to one Egyptian author, at one point the number of Egyptian forces involved in the Yemen operation was more than the number of forces that remained inside Egypt. Abu-Zikra, (1988), p. 50. Fawzi estimated the strength of the Egyptian forces in Yemen in 1964 as 70,000 men. Fawzi, (1984), p. 24. On the increased involvement of the Armed Forces in internal affairs, see, for example, Abu-Zikra, (1988), pp. 82-85.

59. On the Egyptian effort at the time, see for example, Fawzi, (1984), p. 50.


61. Following a dispute over the arrangements for sharing the waters of the River Jordan between Israel, Jordan and Syria, Israel massed its forces on the Syrian border at the beginning of 1960. On 18 February 1960, Egypt moved three divisions into Sinai, signalling to the Israelis that Egypt would act if Syria was attacked, with the result that the crisis was controlled. Labib, (1977), pp. 134-138. However, authors such as Nadaf Safran assert that Israel did not mass troops on the Syrian borders prior to the 1967 War and that reports of Israeli massing of forces were fabricated by Moscow and believed by the Egyptian government. If this claim is true, it means that the Soviet Union created a situation which pushed Egypt into a war when it was unprepared. Safran, (1978), pp. 386-387. Concerning the Soviet role, many Egyptians expressed similar views. For example, see Sadat, (1978), p. 187; Labib, (1977), pp. 162-163; Riad, (1985), pp. 79-80.


64. Fawzi asserts there was no definite Egyptian military strategy before the Arab summit in 1964. It evolved to become a defensive one to prevent Israel from expanding. Fawzi, (1984), p. 49.


70. Israel acquired the American Hawk missile in 1962. The Tu-16 bombers in the Egyptian inventory did not have a stand-off attack...
capability because the Soviets declined to provide them with the 50 mile-range Kennel missile. On this, see Glassman, (1977), p. 34.

71. The combat radius of the MiG-21 was only 200 miles. In the event that air combat or evasion was required, this range was clearly insufficient for participation in a strategic attack.

72. Glassman notes that the Soviets may consciously have been structuring the Egyptian Air Force on a defensively oriented model. Glassman, (1977), p. 34.

73. For the location of the SAM batteries and the numbers of air defence units, see Brigadier Mohammad Zahir Abdul-Rahman, 'Mabadi Al-Harb Fi Quwat Ad-Difaa' al-Jawi Wa-mada Tatbikaha Fi Al-Jawlat Al-Arabiyyah Al-Israelia' (Principles of War in Air Defence Forces: Their Application in the Arab-Israeli Rounds), Nasser Academy, (classified thesis), Course No. 6, p. 22. For the number of Egyptian brigades in 1967, see Fawzi, (1984), p. 64.

74. The main air bases were Bir Gifgafa, El-Arish, Assirr and Bir Thalami in Sinai; Abu-Sueir, Fayid and Kabrit in the Canal Zone; Inshas, Mansoura and Cairo West in the Delta area. Gamil, El-Minya Gharsaka, Luxor, Beni Sueif, Bilbase and Cairo International were also attacked in subsequent raids. For a detailed account of the Israeli pre-emptive strike of 1967 see Luttwak and Horowitz, (1975), pp. 225-231; Armitage and Mason, (1985), pp. 116-118; Labib, (1977), pp. 139-158.

75. The Israelis modified conventional bombs with a retro-firing rocket device to stop them in the air and added a second set of rockets to accelerate their vertical dive to impact. This modification prevented the slithering of ordinary bombs on concrete. Luttwak and

76. In the afternoon of the same day, the Israelis attacked Cairo International Airport and Ras Banaa airfield.


79. I was a duty officer that morning in Ajloun Radar and no ECM jamming observed. Egyptian General Riad who was based in Amman did send a warning cable to Cairo, but it seems it was based on the increased activity of naval vessels of both the US and the USSR. On the story of General Riad's cable, see Abu-Zikra, (1988), p.272; Riad, (1985), p.64.


85. According to General Hod, Commander of the IAF, cited by Luttwak and Horowitz, (1975), p.228. In their timing for the pre-emptive strike, the Israelis were even more successful as the Egyptian state of alert was past its usual peak at dawn (the conventional timing for such attacks).

86. On the views of the EAF Commander, General Sodki, concerning the first strike, see Fawzi, (1984), pp. 125-126.


89. Israeli fighters were able to refuel, re-arm and have their pilots briefed for new targets in as little as seven minutes. This meant that Israeli fighters attacking Egyptian bases could be over their target for a second attack within about an hour. By spacing the waves of attacking aircraft in the way the Israelis did, Egyptian air bases were kept under continuous attack. See Armitage and Mason, (1985), p.117.


91. According to Fawzi, the Syrians did not react to Egyptian appeals to start attacking Israeli air bases in that morning of 5 June 1967. These appeals were made by him and General Riad who was based in Amman. Fawzi, (1984), p.144.


CHAPTER TWO

THE INTERNAL CONFLICT

Their defeat in the June 1967 War left the Arabs despondent and full of frustrations and resentment. The effect of the war on Arab morale was even more significant than the material losses of the destruction of their Armed Forces, the occupation of large amounts of Arab land, and the expulsion of thousands of inhabitants from the now occupied Arab territories. (1) The extent of the defeat pushed some Arab intellectuals towards extreme solutions. They lost hope in the role of Arab military institutions in the Arab-Israeli conflict, and called for a 'people's war' strategy against Israel. (2)

The shock felt by Arab leaders was no less than that felt by any individual Arab. President Nasser of Egypt remained in a state of shock and depression for a few weeks after the defeat. (3) He was facing a dark future; the June War had changed the political map and the power structure of the Middle East. Israel's strategic situation had become much more advantageous: on the southern front, its forces were on the Suez Canal and the Red Sea, while on the eastern front, they now stood on the Jordan River and thirty miles from Damascus. The Israeli Air Force indisputably dominated the skies of the whole area. In Egypt, the defeat threw into doubt the philosophy and policies of the leadership since the Egyptian revolution of 1952. It shattered public confidence in the Egyptian Army as a fighting force, and called
into question the personal leadership of Nasser himself and the regime's method of making decisions. (4) Despite this atmosphere, Nasser managed to keep his nerve, enabling him to retain control of the situation and determine the starting point for recovery. This was to rebuild Egypt's Armed Forces. (5)

In rebuilding the Egyptian Armed Forces, Nasser's aims were to remedy Egypt's total defencelessness and to gain greater bargaining power in his effort to force the Israelis to withdraw from the occupied territories. Nasser began this process by sacking the deputy Supreme Commander, Field Marshal Amer, the Air Force Commander, General Sodki, and the Navy Commander, General Izzat. On 11 June 1967, he appointed General Mohammad Fawzi as Commander-in-Chief (C-in-C), and General Madkour Abu-El-Izz as Air Force Commander. These first steps presented Nasser with a new threat to his position. On that same day, some of Amer's supporters among Army officers demanded that he be reinstated in his command of the Armed Forces. This incident never came to a real test of force, but it was the beginning of a conflict between Nasser and Amer which ended with Amer's arrest and subsequent suicide on 14 September 1967. (6)


The death of Marshal Amer left Nasser free to direct the rebuilding process of the Egyptian Armed Forces. It was not an easy task and was conducted under the pressure of time. The task was to reorganize and regroup what was left of the Army and Air Force, to construct and
strengthen the defensive line along the Suez Canal, and to resupply formations and units with weapons and equipment. What made this task more difficult was the internal dispute between top Egyptian military commanders with regard to the reorganization of the Armed Forces.

In this chapter, I will show how the rebuilding process of the Egyptian Armed Forces (1967-1970) was influenced by the internal struggle within the Army Command over the structure of the Armed Forces, itself basically a bureaucratic dispute between the Army and the Air Force. In doing so, a brief discussion of the Egyptian defence decision-making process before 1967 - the background against which this dispute arose - will be followed by a discussion of the respective arguments of both sides, their motivations, the factors which determined the outcome of the debate, and the impact and consequences of the final decision.

The Egyptian Defence Decision-Making Process before 1967

Up to the defeat of June 1967, immense power had been concentrated in Marshal Amer's hands. This had occurred gradually as exceptional authority was delegated to him by the Revolutionary Command Council (RCC), the Presidential Council, and President Nasser himself after Egypt's revolution in 1952. (7) Marshal Amer always felt that the Armed Forces backed him and that he had the final say in the future of their personnel, while he maintained a very special relationship with Nasser. He had become prominent as a result of the conflict between the members of the RCC and the members of the Presidential Council.
which erupted in the early 1960's. His feeling of strength came from his command of the Armed Forces, which saw themselves as the makers of the revolution and as an instrument of change in the country. Amer also knew that Nasser avoided conflict or open confrontation with him, unlike what had happened in the case of the rest of the RCC members. (8) As a result, it was possible for Amer to take advantage of these conflicts to keep Nasser away from the Egyptian Armed Forces and to curtail his power and authority over them.

On 29 November 1962, the Presidential Council attempted to invoke its legitimate authority over the promotion of senior officers in the Armed Forces. Amer's resignation on that day, following his disagreement with Presidential Council members over allocation of authority, had serious repercussions among Army officers. Immediately, Amer's supporters among senior Army officers met at the General Headquarters in Koubri Al-Qubba in a show of force and demanded that Amer should stay in command. Amer's resignation was not accepted and a compromise was arrived at: his title was changed to deputy Supreme Commander of the Armed Forces but his authority remained unaltered. (9) After this incident much legislation and many decrees were passed concentrating power over defence-related matters in Amer's hands.

Three Presidential decrees were issued after the threatened resignation. (10) The first was decree number 2878/1962 which states: 'The deputy Supreme Commander of the Armed Forces will be responsible to the President and the Presidential Council for the Armed Forces for the administrative and military aspects'. This decision, in fact, left
all responsibilities and all authority to Amer himself. The second
decree, number 117/1964, was issued in 1964, and states: 'All
responsibilities and authority of the Minister of War related to the
Armed Forces shall be transferred to the deputy Supreme Commander of
the Armed Forces'. The most surprising Presidential decree was number
1956/1966, which states: 'The Minister of War Mr. Shams Badran will
assist the deputy Supreme Commander of the Armed Forces in exercising
his responsibilities and authority, and will be responsible to him on
whatever is delegated to him of the Armed Forces affairs in their
administrative and military aspects'. (11) According to this decision
the Minister of War became responsible to the deputy Supreme
Commander, not to the President or the Prime Minister. (See Figure
One).

It is evident that Marshal Amer dominated the Egyptian defence
decision-making process. Those commanders and senior officers who were
loyal to Amer retained their positions for long periods of time. For
example, General Sodki, the Egyptian Air Force Commander, who had the
full support of Marshal Amer stayed in his command throughout the
fifteen years during which Marshal Amer was in command. This situation
left General Sodki with a free hand in the Air Force, and he became
stronger when his authority was extended (with Amer's backing) over
Egypt's national airline company and the Civil Aviation Authority. (12)

As a result of the hidden struggle for power between Nasser and
Amer, group decision-making in important defence matters had vanished
and all decisions were left to Amer, who was also involved in the
The Decision-Making Structure of the Egyptian Armed Forces before 1967 (13)
politics of the country. Consequently, both Nasser and Amer failed to assess the actual fighting capabilities of the Armed Forces before June 1967, Nasser being kept away from the Army and Amer being interested in the country's politics and his own diversions. (14)

The Dispute over Reorganization

After the defeat of 1967, Nasser took personal charge of military affairs. On 11 June 1967, he appointed General Fawzi (originally an Air Defence officer) as Commander-in-Chief of the Egyptian Armed Forces and instructed him to start a reorganization process. (15) On the same day also, in addition to accepting the resignation of Marshal Amer, the deputy Supreme Commander and Shams Badran, the Minister of War, Nasser accepted the resignation of the top seven Generals including the Navy, Air Force and Land Forces Commanders, and dismissed six more Generals. (16) Amin Huwadi was appointed as Minister of War, General Abdul-Monem Riad (previously an Air Defence officer) as the new Chief of Staff, and General Madkour Abu-El-Izz as Commander of the Egyptian Air Force (EAF). (17) Later, hundreds of senior Egyptian officers were dismissed both on performance evaluation bases and as a result of Army recriminations.

Soon it became evident that there were two conflicting views with regard to the status of the Air Force and ground-based air defence (which formed a single force at that time). The Commander-in-Chief, supported by some Generals, including General Ali Fahmi—who was to become the first Commander of the separate Air Defence Command—held
conflicting views from the top Air Force commanders including the newly appointed Commander of the Air Force and Air Defence. General Fawzi, representing the first group (the Army group), thought that the Air Force should not be independent but rather integrated with the other services, and should stay under the Army Command and be controlled through the same Army departments and staffs. The first group also called for removing the air defence from under the Air Force Command, establishing a separate command for it and place fighter defence under its operational command. These views were expressed by General Fawzi, the new C-in-C, in the very first meeting with the newly appointed Commander of the Air Force and Air Defence, General Abu-El-Izz, on 11 June 1967. (18) General Fawzi was determined to implement his ideas, and started the battle over the reorganization of the Egyptian Armed Forces.

The Arguments of Both Sides

The arguments of both groups were limited and lacked depth and perception. Disputing the Air Force's independence, the first group focused its argument on the single issue of the need to integrate all the services to be able to function properly, while the second group based its argument on the distinctive nature, problems, and roles of the Air Force which necessitated its independence. Regarding the establishment of a separate Air Defence Command, the argument of the first group revolved around the need to allow the air defence to develop without restrictions. The second group resisted air defence independence but failed to produce any clear arguments to that effect.
Representing the first group, General Fawzi was a strong advocate of the concept of joint operations between different arms on the battlefield and called for more cooperation and coordination. He argued that the Air Force, like any other service, had its role, and should therefore be controlled in the same manner as those other services and be integrated into the Armed Forces as a whole. Stressing this point, Fawzi blamed the defeat of the Egyptian Armed Forces on their lack of ability to conduct joint operations. He considered that the Armed Forces had fought in the 1967 War with no concept or directives on how to coordinate between services on the battlefield. (19) Furthermore, he pointed out that realistic training in using weapons, and joint training between large formations and units had been cosmetic and artificial. He revealed that, until 1967, the Armed Forces had never practised methods of conducting joint operations or ways of coordinating between different combat formations and combat supporting units. All there was theoretical instruction on these matters at military educational institutions. (20)

To translate his strong belief in joint operations into action, Fawzi insisted that the Air Force should be totally integrated into the Army Command and be controlled through the Army Headquarters. Following the completion of the reorganization of the Armed Forces in 1968 Fawzi wrote:

'Unifying the top command of the Armed Forces was a prelude to the integration of the Services. The Armed Forces have integrated into one head and one body. Defining the responsibilities and authority of every member of this huge entity in this law made it hold together
tightly and function in one way under one command towards one goal. Thus the bureaucracy which was reinforcing the separation of the services had disappeared from the Armed Forces'. (21)

Concerning the establishment of a separate Air Defence Command, the first group argued that the duality of command by the Air Force and by the Artillery over air defence had been responsible for the flaws and confusions in it. (Air defence operations had come under the command of the Air Force but personnel and logistical aspects had come under the Artillery.) This group also argued that the development of air defence had been restricted by this duality of command, and that it was difficult for the Air Force commander to control two main forces at the same time. In addition, they believed that the air defence was becoming too specialized to be commanded by the Air Force and therefore needed to be independent. (22)

General Fahmi, a member of this group, who was appointed the first Commander of the Air Defence Command in June 1969 and was before that at the air defence branch holding different senior staff positions, had long been a strong advocate of establishing a separate Air Defence Command. General Fahmi believed that there had been a lost opportunity to establish a separate Air Defence Command before the 1967 War, and so the decision in 1968 had come too late. Fahmi's argument was that, as long as all means for offensive aerial operations were concentrated under one command, all means for defensive operations should be concentrated under one commander too. (23) Implied in this argument that although air defence came under the Air Force, decisions
concerning air space defence were made by two different branches in the Air Force.

The second group, which consisted of Air Force officers led by General Abu-El-Izz, argued that the Air Force by its nature, circumstances, and distinct role should stay independent from the Army, though coordinating with it closely under the umbrella of the C-in-C. Their view was that the Air Force had its own characteristics and its own problems. It was inconceivable to see the Air Force under the control of the Army, for Abu-El-Izz believed that the Army staffs and departments were not specialized and could not comprehend the problems and difficulties facing the Air Force.

General Abu-El-Izz argued that for the Army to exercise command and control over the Air Force was absolutely unacceptable for organizational and technical reasons. It would be against the logic and principles of organization, and the Air Force would then be faced with bureaucracy and complications which would hinder it from functioning properly. Therefore, it would not be in the interest of the Armed Forces to adopt this new organization. He also pointed out that Army staff were not qualified to plan for operations which included the Air Force in its absence. In Abu-El-Izz' view, Air Force officers were more aware of air power's capabilities and limitations. (24)

General Abu-El-Izz considered that rebuilding the Air Force required training new pilots and technicians, as well as retraining
the old ones. He argued that this task was purely technical and specialized and required the supervision and control of the Air Force. In his view, the Armed Forces Headquarters staff were not qualified for this, and their decisions would be based on the recommendations of their Soviet advisers. General Abu-El-Izz therefore objected strongly to the proposed organization. (25)

Later, in his memoirs, Abu-El-Izz cited examples to prove that Army dominance over the Air Force was a mistaken concept. In one incident in 1967, General Headquarters issued an operational order to the Air Force to attack an Israeli armoured brigade which they believed was preparing to cross the Suez Canal in the northern sector. The Air Force did not attack but sent a reconnaissance flight which discovered that there was not a single tank in that area. General Abu-El-Izz wondered what the consequences would have been if he had ordered a mission of that size to find nothing to attack but sand. (26)

As far as the air defence was concerned, General Abu-El-Izz believed that establishing an independent command for the air defence was unjustifiable in a country like Egypt because of its limited resources, and he blamed the Soviets for supporting the idea of a separate command. Abu-El-Izz felt that Soviet support for establishing a separate Air Defence command coincided with their refusal to provide Egypt with better offensive equipment and their reluctance to help improve the standards of Egyptian pilots and technicians. According to this reasoning, establishing an Air Defence command would be a good
excuse for providing Egypt with defensive weapons rather than offensive ones. (27)

Underlying Motives

In exploring the conditions which influenced the stand taken by both sides in this dispute, three main underlying motives stand out: personal reasons, recrimination over the 1967 defeat, and inter-service rivalry.

Personal Reasons

To start with, General Fawzi's past experience had strongly influenced his thinking regarding the independent arms. Fawzi was appointed Chief of Staff in 1964. At that time, this post lacked real responsibilities and authority. General Fawzi says in his memoirs: 'Nothing of my job's duties was left to me but to repeat orders, directives, and instructions or to re-interpret, re-type and disseminate them to the Armed Forces'. (28)

Fawzi was never close to or trusted by Marshal Amer, and the various commanders never paid attention to the Chief-of-Staff's orders, unless they were signed by the Marshal. (29) Under this situation, every commander of the forces worked alone, without coordination or cooperation with the others. Every commander was encouraged to be independent and so sought sole command and control over his forces.
The commanders refused to cooperate with or help other forces without the personal orders of Marshal Amer.

Furthermore, Fawzi was junior to most of the commanders of the forces, especially Sodki of the Air Force and Izzat of the Navy. His lack of seniority made his job more difficult and left him with no power over the others. His orders were ignored by both Navy and Air Force Commanders, and therefore he could not coordinate between them. In his memoirs, General Fawzi states: 'General Abdul-Mohsen Kamel Mourtaja, the Commander of the Land Forces, who was the only Commander junior to me, grasped the situation and started to demand more authority in commanding and controlling his forces, similar to that which the Air Force and the Navy Commanders enjoyed'. (30)

Thus, because of Amer's absolute support to the commanders of these independent services, Fawzi developed a negative attitude towards them. In the training of these services, for example, Fawzi noted that the commander of each force or service who was responsible for the training of his units was in fact imitating Marshal Amer: that is, he looked down on his task and only attended to part of his unit's training as a formality. (31)

General Fawzi's negative attitude was extended to the Air Force pilots. He could not hide his deep dislike of the favouritism that pilots used to enjoy from top commands. Fawzi described the friendly way Marshal Amer treated pilots during an inspection visit to Inshas air base by Nasser, Amer and Sodki on 22 May 1967, saying that,
'Amer's conversation with the pilots was one of familiarity and reflected his preferential treatment'. (32)

On the other hand, General Abu-El-Izz, the newly appointed Air Force Commander, had no confidence in the C-in-C Fawzi, and had always suspected his attitude and motives towards the Air Force. Abu-El-Izz was aware of Fawzi's personal dislike of Air Force pilots, and so viewed the latter's position regarding the Air Force as motivated by personal hatred.

In his first meeting with Nasser on 11 June 1967, the day he was appointed Commander of the EAF, General Abu-El-Izz claims that he told President Nasser that he was expecting that the problems and difficulties which would face him in his new command would come from certain commanders he had to deal with. Abu-El-Izz said: 'I know them well, I know their history, I mean General Fawzi, the new C-in-C, and a few opportunistic and self-seeking officers in the General Headquarters ... I know as well the way they used to treat the Air Force and the bias they hold against it'. (33)

General Abu-El-Izz was convinced that Fawzi was looking for a scapegoat to divert attention from his own role as one of the top commanders during the defeat of 1967. Abu-El-Izz believed it was because of this background that Fawzi had adopted a fanatical position against Sodki, as Commander of the Air Force during the 1967 War, and against the Air Force in general. This attitude had extended to the
new Commander of the Air Force and for the same reason Fawzi insisted on prosecuting the Air Force commanders. (34)

At the same time, General Abu-El-Izz felt that General Fawzi was unreliable and dishonest. He presented a few cases to prove this opinion of Fawzi's behaviour. For example, he claimed that they had once agreed on a list of officers for retirement, but that it was changed by Fawzi before being presented to the President for ratification. (35) Another example was when, following the 1967 defeat, the President had agreed to allocate funds for building aircraft shelters; according to Abu-El-Izz, General Fawzi had expressed his agreement, but had pressed the Air Force Commander next morning to accept only half of the amount. (36) This loss of confidence led Abu-El-Izz to perceive the reorganization plan as an attempt by General Fawzi to control the Air Force and to obtain revenge against it and its officers.

The Egyptian Air Force's Responsibility for the 1967 Defeat

Due to the nature of the 1967 War, and in particular to the Israeli pre-emptive strike which wiped out the Egyptian Air Force in the first few hours, a considerable number of Egyptians believed that the Air Force was responsible for the defeat as it had completely failed to protect itself, let alone to defend Egypt's sky. Some Egyptians argued that, had the Air Force been alert and survived the first Israeli air strike, the course of the 1967 War would have been different. The
manner in which the EAF was forced out of battle in 1967 brought back
the memory of the similar failure in 1956. (37)

The process by which this picture developed was partly influenced
by the focus of the Egyptian media on the failure of the Air Force. As
the Egyptian people were eager for news explaining their humiliating
defeat, the release of news on the Air Force failure, fascinating as
it was, satisfied and influenced the Egyptian public to the extent
that the masses took to the streets to protest against what they saw
as lenient sentences passed on senior Air Force officers accused of
negligence during the 1967 War, and forced a repeat of their
trial. (38) However, although according to General Fawzi himself, air
defence failed as badly as the Air Force in the 1967 War, the fact
that it had been placed under the command of the Air Force seems to
have helped it to escape its share of responsibility for the defeat.

The Egyptian leadership at that time maintained a high level of
control over the Egyptian press through appointing or sacking key
personnel. This degree of control was made possible by the fact that
most shares in the Egyptian press were owned by the public sector,
following its nationalization by the revolutionary regime. (39)
Considering this situation, it is most likely that, at the very least,
the Egyptian leadership blessed this focus on the Air Force failure in
1967, and may actually have leaked information for the purpose of
providing a scapegoat for the frustrated public.
Under these circumstances, a change in the image held by society and the Armed Forces themselves with regard to the performance of the Air Force, its role and its missions, started to develop. This change of image created an opportunity for the new military command (General Fawzi, the C-in-C, and General Riad, the CoS) to put forward a new set of reform plans. Moreover, changes in key personnel in the Egyptian Armed Forces following the 1967 defeat, particularly the dismissal of the strong Marshal Amer and his supporters among senior Egyptian officers, also provided an opportunity for seeking new measures. The new military command felt obliged to review many of the policies of the previous military command, and in the process General Fawzi tried to push ahead with his personal ideas which had been blocked in the past by Marshal Amer and his supporters. In addition, since General Fawzi (the C-in-C) and General Riad (the CoS) were loyal to Nasser and confirmed this by taking his side during the Nasser-Amer struggle, the new military command felt almost certain of the President's support and was encouraged, therefore, to seek dramatic changes in the organization of the Armed Forces.

General Fawzi believed that because the Air Force had been independent and highly privileged, it was not prepared for war in 1967 and so was responsible for the defeat. Criticizing the Air Force, Fawzi noted that the dreadful shortage of fighter pilots and flight engineers in the Air Force prior to 1967 had degraded its capability and affected the entire Armed Forces. He concluded that this was enough in itself to prevent the country from waging an armed conflict with Israel in 1967. He further noted that, previously, fighter
aircraft had been stored upon arrival for long periods of time before being used. He gave an example of a squadron of SU-7's kept in their crates: they were not assembled and did not taken part in the June 1967 War. (40)

In response to those who criticized the defence budget cuts for the fiscal year 1966/1967, and especially to those top Air Force commanders who defended themselves during their post-war trials by claiming that the cutbacks had prevented them from adequately preparing their forces for war, General Fawzi wrote that there was no excuse for being unable to construct aircraft shelters. He added that, 'Despite the fact that the Air Force was not convinced of this project - the shelters were described as aircraft graves - the War Minister had endorsed the project late in 1966'. (41) According to Abu-El-Izz, Fawzi claimed that the Air Force had wasted the budget for building aircraft shelters by building officers' messes for the comfort of the pilots. (42)

General Fawzi's claim was denied by General Abu-El-Izz who commented that, 'No funds were allocated in any of the Armed Forces budgets between the years 1956 and 1967 to constructing shelters, except a small amount of money in 1956, which was allocated to building one shelter for trials and it proved unsatisfactory'. (43) He added that General Headquarters had in fact refused requests for money to build aircraft shelters. (44) Ten years later, after the 1967 War, General Sodki (Air Force Commander 1952-1967) told friends that after the experience of the 1956 war, he was convinced of the importance of
aircraft shelters to protect aircraft from surprise attacks, but he could not persuade the top commanders, including President Nasser. (45)

An interesting issue, and one reflecting Air Force mistakes, was that of the Inshas party. On the eve of the 1967 War, the Public Affairs Department of the Air Force called a party at Inshas fighter air base, and invited personnel from Air Force and air defence units in the area. Much has been said and written since the war about that party. Senior officers and pilots were accused of drinking alcohol until the early hours of the morning, which made them unable to do their duty next morning at the time of the Israeli attack. Three consecutive committees were set up to investigate what happened that night; the first was ordered by the Public Intelligence Administration, the second was conducted by the General Headquarters of the Armed Forces, and the third was an internal Air Force one. None of the three committees accused anyone and they concluded that the party had been an ordinary and innocent one. (46) Despite that, General Fawzi asserted that 'other things changed that party from an innocent to a wild one, which paved the way for lies and rumours to circulate accusing the Air Force and its command'. (47) This comment, and General Fawzi's order to set up a second investigation committee from within the Army, indicates that he was not only suspicious of what was going on in the air base, but that he also wanted to focus attention on Air Force irresponsibility.
Inter-Service Rivalry

The battle over the reorganization of the Egyptian Armed Forces following the 1967 defeat is a typical example of bureaucratic politics. The case was a classic dispute between the Army and the Air Force over the redefinition of the essence of each agency's activity (roles and missions). The differences between the Army and the Air Force reflected a struggle for dominance. Taking advantage of the crisis situation and feeling obliged to review many of the previous policies which led to the 1967 defeat, the Army was determined to reunify all forces under its command, while the Air Force was desperately seeking to guard its autonomy.

The conflict over reorganization was between two schools of thought: those who called for complete Army control over the Air Force and the establishment of a separate Air Defence Command, and those who struggled to keep the Air Force independent, and to keep air space defence under Air Force command. The difference of views inside the Armed Forces was triggered by the new military command, who felt the need for a redefinition of the essence of the Air Force.

The Army on the one hand, seeking to have influence in order to pursue its objective effectively - which it had failed to do in previous wars - insisted on the reunification of the entire force under its command. (48) This pursuit of influence was strongly felt to be in the national interest. Moreover, the Army felt that the Air Force was dominating the air defence, preventing it from expanding or
demonstrating its actual capability. This was partly true as, until June 1967, the air defence forces were commanded by Air Force pilots. For example, Brigadier Ismail Labib was Commander of the air defence during the 1967 War; he was at the same time director of the Air Force Commander's office, and director of the security branch in the Air Force. Brigadier Ismail was considered by most Air Defence officers as professionally incapable of commanding the air defence. (49)

On the other hand, the Air Force felt threatened by the new challenge of the redefinition of its essence. Since its inception as a separate service, the dominant view within the Air Force had been that its essence was the defence of Egyptian skies, as well as the flying of combat aircraft designed to perform other missions. Now, this was challenged by the reorganization plans.

Air Force fears were reflected in the way General Abu-El-Izz perceived the reorganization plan. In his view, General Fawzi wanted the Air Force to be like any other combat or support corps, similar to the Artillery, Infantry, and Signals. (50) Moreover, the Commander-in-Chief insisted that the old Land Forces Command should be eliminated in the new organization, and that Army units should be controlled through different departments and staffs of the General Headquarters. General Abu-El-Izz interpreted this as an attempt by the Commander-in-Chief to command and control the entire Armed Forces with their different services through his own staff, itself basically a land forces staff. He also felt that Fawzi wanted the Air Force and the Navy to be on an equal footing with the individual Army Corps. (51)
By starting to exercise command over the Air Force, even before the final endorsement of the new reorganization plan, the Army created more clashes with the Air Force. General Fawzi and his staff issued operational and administrative orders which were, according to Abu-El-Izz, impossible to implement. General Abu-El-Izz claimed that he was forced to seek recourse to the President to make General Fawzi change his policy and accept that, before issuing the final orders, the Air Force should be consulted. (52) Another cause of clashes were the inspection teams which the General Headquarters formed to visit and inspect training in different units including the Air Force. Abu-El-Izz says that, except for one Air Force officer, all members of the inspection committee were Army officers, a situation to which he objected strongly and he denied the team the right to visit Air Force units. (53)

Air Defence officers supported the Army's view of the need to redefine the Air Force role. They took the line that air defence was becoming too specialized to be left under the Air Force, and that it could prosper only if a separate Air Defence Command was established. (54) In their attempt to enhance the role of their command, Air Defence officers had the support of top Egyptian military commanders. Though no explicit confirmation exists, it was probably no coincidence that C-in-C Fawzi, and his CoS Riad took a relatively hostile position towards the Air Force and a supportive one towards a separate Air Defence Command, since both men had previously been Air Defence officers.
Although basically General Abu-El-Izz was seeking to guard the Air Force's independence, few rational arguments on its roles and missions were advanced. His arguments on the need for the Air Force to have total operational control over its forces and to be in a position to decide priority in logistics and training were an exception, but much of his basic position depended on criticizing the attitude of General Fawzi and the Soviet advisers towards the Air Force.

Since the Air Force had failed badly in the last two wars, General Abu-El-Izz was not in a position to argue strongly about the need to keep the Air Force independent. Nor he was able to produce any coherent argument against the establishment of a separate Air Defence Command. Most likely, therefore, the shift in Abu-El-Izz's arguments to focus on personal attacks was in order to take advantage of General Fawzi's vulnerability as one who had held a senior position in the previous military command responsible for Egypt's defeat, though with no real power. In contrast, most of General Fawzi's argument focused on the need to integrate all the forces required to carry out the Armed Forces' missions, although the question of Air Force independence did evoke a deep personal response from General Fawzi as a result of his earlier experiences.

Nasser: the Determinant

In the event, Nasser inclined to favour General Fawzi's position and so Fawzi won his battle with the Air Force which ended with the resignation of its Commander, General Abu-El-Izz, and twenty Air Force
officers on 30 November 1967. Consequently, the new plans for reorganization which were endorsed in 1968 included establishing a new Air Defence Command. There follows a discussion of why Nasser opted to support General Fawzi.

The President stands at the centre of the defence policy process in Egypt. His role and influence over decisions are qualitatively different from those of any other agency. After the 1967 War, President Nasser became the principal figure determining any defence policy decision. Despite this increased role, he did not act alone. He was surrounded by a number of participants with whom he consulted, mostly on his own initiative. Each of these might have focused on a different aspect of the issue, or might have been indifferent. Whom Nasser consulted usually depended in large part on the nature of the issue; on issues related to the Armed Forces, the Minister of War, the C-in-C, the CoS, the Director of Military Intelligence, and military commanders in the field were likely to be consulted occasionally, collectively or on an individual basis, because of their formal responsibility and access to information. There is, however, no evidence to show that Nasser raised the Army-Air Force conflict over reorganization of the the Armed Forces in cabinet meetings, or that he consulted any of his colleagues in the RCC or the Presidential Council.

The Ministry of War (now Ministry of Defence) never played an important role in defence issues in Egypt, as it came under Marshal Amer before 1967. Since then, with the exception of Mr Huwadi's short
term as Minister of War (June 1967 to January 1968), all Egyptian C-in-Cs have been Ministers of Defence as well. As the battle for reorganization raged during Mr Huwadi's term, he took no specific stand on the dispute; rather he attempted to promote a compromise. (57) Huwadi's decision to remain indifferent may have been for one of the two following reasons. First, he did not have enough time in office to decide on policies and strategy, or put forward new options, especially as he had little background experience. (58) Second, the general hostile atmosphere against the Air Force would have made him reluctant to support it in opposing the Army proposals. As the change was viewed as a departure from old policies dating from Amer's total command of the Armed Forces, supporting the Air Force may have been misinterpreted as defending Amer's policies. In any case, Huwadi failed to sense the danger posed to his personal interest by General Fawzi as he was seizing more power. Soon after Fawzi won his battle against the Air Force, he also took Huwadi's office.

With the exception of consultation with the Soviet advisers, Nasser abstained from consulting with groups outside the Armed Forces on this issue, and he only consulted a limited number of military commanders. (59) It is worth noting, in this context, that most senior Army officers were indifferent at the time, considering the issue to be less important than it turned out to be, and also reflecting their tendency to refrain from expressing differing opinions at a time when, in their view, all effort should be concentrated on actual reconstruction rather than theoretical discussions. (60) Thus, Nasser
was presented with fewer alternatives and was unable to develop a thorough assessment of the consequences of both sides' demands.

Nasser's initial perception seems to have been that this internal conflict was nothing more than a personality clash between the two commanders (Fawzi and Abu-El-Izz). (61) Later, however, Nasser appears to have grasped the significance of the differences between the commanders, and came to view the Army-Air Force conflict as a bureaucratic dispute. In an article in *Al-Ahram* entitled 'The Internal Front', Mohammad Heikal, Nasser's confidante, explained the removal of General Abu-El-Izz from his command by saying that the latter belonged to a school of thought which believed in the complete independence of the three arms, whereas the other school of thought considered that this autonomy should be decided according to circumstances, and that all three arms should be integrated into one fighting structure. (62)

Nasser's final decision to support the C-in-C, Fawzi, in the internal fight was mostly dictated by his own interests based on the following factors:

1. Nasser's Personal Experience. Nasser's knowledge of General Fawzi dated back to the late 1930s when both men were cadets at the Military Academy. (63) In 1964, upon Nasser's insistence, Amer accepted Fawzi's appointment as Chief of Staff, but as discussed earlier, he was deprived of authority and responsibilities. Fawzi was seen by Amer and his supporters as 'Nasser's Man' inside the Armed Forces. Given the circumstances, Nasser needed Fawzi's services badly, especially as he
trusted him and knew that Fawzi had no political ambition. According to Heikal, General Fawzi 'was not an imaginative man, but he had the deserved reputation of a strict disciplinarian - too strict, perhaps, for he rode roughshod over all human consideration. Nasser called him "the cruel disciplinarian", but his qualities were what was needed to pull together an army demoralized by incompetence and favouritism during the time of Field-Marshal Amer'. (64)

In contrast, Nasser did not know Abu-El-Izz earlier. President Nasser came to know the man during his command of the Air College at Bilbase (1954-1961). Nasser's judgement was that Abu-El-Izz with his training experience was suitable for the task of rebuilding the Air Force. (65) Therefore, he was called back from the office of Aswan Governor to resume the Air Force Command.

In the past, Nasser had developed a negative attitude towards the Air Force. Amer's full support of General Sodki, the Air Force Commander between 1952 and 1967, during which period Nasser had proposed his dismissal following the 1956 experience, made Nasser cold and distant towards the Air Force. In addition, Nasser had less personal knowledge of Air Force officers, having served himself as an infantryman. Nasser's negative attitude was strengthened by his deep disappointment with the Air Force for failing to take seriously his warning on 2 June 1967 of an impending Israeli air strike. That Nasser had developed a strong anti-Air Force feeling was reflected in his choice not to defend the Air Force officers held responsible for the 1967 defeat. Nasser also did not intervene to stop the press from
focusing on the Air Force failure. In this context, it is interesting to note that Nasser had taken a great risk by allowing the press to expand on the Air Force failure, knowing that this might lead to some more serious repercussions for his leadership. This invites speculation that his confidante Mohammad Heikal, Chief Editor of Al-Ahram, may have played a decisive role in directing and controlling the press campaign.

During the short time he commanded the Air Force, General Abu-El-Izz had been extremely critical of General Fawzi, accusing him of being one of the commanders responsible for Egypt's defeat, forgetting that Nasser himself was at the head of those commanders. (66) More significantly, General Abu-El-Izz had shown sympathy for some Air Force officers who had contacts with the Muslim Brotherhood (Nasser's fiercest enemies) and whom Nasser had wanted to send into retirement. (67) Although it is not certain to what extent Abu-El-Izz's stand in defending those officers was based on personal reasons, or on purely Air Force interests, his behaviour may have led Nasser to suspect his intentions.

2. The Soviet Advice. After 1967, Nasser had complete confidence in the Soviet advisers, allowing them a free hand inside the Armed Forces. His view was that Egyptian officers had to work hard and learn as much as possible from the Soviets. On disputed issues between Egyptian commanders and the Soviet advisers, Nasser always supported the Soviets. The most striking evidence for this is that Nasser was thinking at this time of assigning Soviet commanders for the Air Force.
and the Air Defence. (68) This may have meant that he wanted to put additional pressure on the Soviets to take greater responsibility for Egypt's military reconstruction, or that he had lost confidence in his military commanders. It is most likely that Nasser thought he might exert more pressure on the Soviets this way. Nasser never ceased to appeal for more support, but assigning Soviets to command his forces would have been very damaging to his leadership's reputation on the international, regional and domestic level. (69) Nevertheless, Nasser's thoughts reflect the degree of trust and hope he attached to the Soviets.

Marshal Zakharov, Chief of Staff of the Soviet Armed Forces, arrived in Egypt on 19 June 1967 at the head of a large military mission to help the Egyptians in rebuilding and reorganizing their Armed Forces, and stayed until the construction of the first defensive line west of the Canal had been completed. He was close to Nasser and used to call upon him often. Marshal Zakharov's view as regards the EAF was that its defeat was due to inability to use Soviet aircraft and that the EAF was a 'bourgeois force'. (70) Most important, Marshal Zakharov supported the idea of establishing a separate Air Defence Command in Egypt, along Soviet lines. (71)

As they attributed much of the blame for Egypt's defeat in 1967 to the military and political shortcomings of Egyptian command personnel, the Soviets believed that a reshaping of the Egyptian officer corps would have to be encouraged. (72) Evidently, Nasser was convinced by these views. (73) Moreover, the Soviets believed that certain social
groups in Egypt, such as the businessmen, the village elite, certain bureaucrats and military officers, and religious circles, viewed Egypt's defeat in the 1967 War as an opportunity to overthrow Nasser's progressive regime. (74) They argued that the regime must stay on the alert to guard its interests against those groups.

Unlike Fawzi, Abu-El-Izz's relations with the Soviet officers were critical and hostile. He believed that his persistence in requesting offensive weapons had provoked the Soviets and made them want to get rid of this obstacle. General Abu-El-Izz goes as far as to state that the Soviets had nominated two potential successors and that they achieved what they wanted. (75) Critical as he was, and having sympathized with religious groups inside the Armed Forces, it is possible that the Soviets had classified General Abu-El-Izz as among those hostile to a progressive regime in Egypt, leading to an increase in Nasser's suspicion of Abu-El-Izz. This explains the Soviet request that the Air Force Commander and other senior Air Force officers be dismissed.

Thus, the willingness of the C-in-C, whom Nasser trusted and needed at the time, to replace the Air Force Commander, as well as the increased suspicion of Abu-El-Izz's loyalty to the regime and the increased friction with the Soviets influenced Nasser's decision to support Fawzi and to sack Abu-El-Izz.
Impact and Consequences

The battle over the reorganization ended with the dismissal of the Air Force Commander and twenty other senior Air Force officers, and with the ratification of the new organizational plan in March 1968 (see Figure Two). The most important change in the structure of the Armed Forces was the establishment of a separate Air Defence Command, since it had a profound effect on Egyptian force structure, and consequently, on Egyptian military strategy.

The most significant impact of the Army victory over the Air Force was that it created a suitable environment for the Air Defence Command to prosper rapidly, as the focus of Egyptian military planning was diverted to air defence and more resources were allocated to the new command. Had a separate Air Defence Command not been established, it is difficult to see the air defence expanding in a very short time to consist of an estimated 75,000 men by October 1973. (76) Its independence facilitated the growth which the Air Force would not have allowed had air defence stayed part of the Air Force. Moreover, as Marshal Zakharov favoured establishing the new command, more Soviet assistance was provided to it. The air defence was also insulated from the environment of increased hostility to the Air Force owing to its taking responsibility for Egypt's defeat in 1967 and to its being perceived as a 'bourgeois' force - against socialism. With the dismissal of Abu-El-Izz and his supporters the Air Force lost a considerable number of experienced officers at a time when it needed them most for its rebuilding process.
The New Decision-Making Structure of the Egyptian Armed Forces (77)
In the conflict, neither group had perceived the consequences of establishing a separate Air Defence Command. There is no indication in either group's arguments that the balance between offensive and defensive capabilities would be affected by the proposed reorganization plan. Although the Air Force group had complained that the Soviets were not willing to provide the Air Force with effective offensive weapons, this lack of offensive weapons did not come out in their arguments when opposing the idea of establishing the new command at the time. (78) Later, in his letter to President Sadat on 10 March 1972, General Abu-El-Izz did argue that emphasizing air defence capability without having an effective Air Force would not be sufficient to achieve victory over the enemy. He said that air defence weapons could not be effective in inflicting heavy losses on the other side, but in its determination to achieve its goals, Israel would destroy the air defence gradually until it overcame them. (79) Abu-El-Izz had not employed these views on air defence in his argument during the battle over reorganization in the second half of 1967, suggesting that no change in the offence-defence balance was then envisaged. It seems that these views were developed in later years when air defence was strengthened and the Israeli Air Force had started to suppress air defence sites as a response to the start of the War of Attrition.

Although Fawzi admitted that both the Air Force and the air defence failed badly in 1967, the Air Force was blamed for the failure of both. Influenced by his experience, General Fawzi was convinced that Air Force domination suppressed the potential of the air defence. Thus, he thought that the only way to develop the air defence was by
making it an independent arm. In his reconstruction programme, plans were drawn up to rebuild the Air Force and the air defence in a balanced manner. During that period (1967-1971), air defence expansion plans were continually changing with the result that, by 1970, according to Fawzi, the Egyptian Air Defence strength of SAMs had increased to four times the strength originally sought, suggesting that Fawzi did not think of having an air defence of the size it had turned out to be by the end of 1970. Rather, other factors interfered - as will be discussed in the following chapters - and dictated this increase.

Finally, in the argument of the C-in-C and his group, the emphasis was on the integration of all Arms and joint operations. Ironically, establishing a separate Air Defence Command, which was their demand, contradicted their basic line of argument. By establishing this command and placing fighter defence under its operational control, they split the Air Force into two: defence and offence fighters, creating more problems of cooperation and coordination between the two commands, such as those relating to providing early warning, controlling interceptors and ground attackers, identification, and creating safe corridors in air defence zones. What actually happened was the disintegration of the Air Force, restricting its flexibility to use its resources in different roles.
References


11. Ibid.

12. In an interview, Captain Mahmoud Ramadan, a member of the board of Egypt Air at this time, described the way General Sodki used to chair meetings and impose whatever he wanted. Speaking from a critical point of view he said, 'Sodki was powerful because of Amer's backing, they were everything in the country'.

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13. This is derived from Fawzi's description. Fawzi, (1984), pp. 31-46.
15. General Mohammad Fawzi was Chief of Staff of the Egyptian Armed Forces during the 1967 War. On 11 June 1967, he was appointed Minister of War and C-in-C. On 14 May 1971, he was accused of plotting to overthrow the government and was imprisoned for a few years.
16. The senior Egyptian officers who resigned were; General Suleiman Izzat, the Navy Commander, General Mohammad Sodki Mahmoud, the Air Force Commander, General Mohammad Ahmad Haleem Imam, Assistant to the deputy Supreme Commander, General Hilal Abdullah Hilal, Assistant to the deputy Supreme Commander, General Jamal Afifi, deputy to the EAF Commander, General Abdul-Mohsen Kamel Murtaga, General Commander of the Eastern Front and Commander of the Land Forces, and General Anwar Qadhi, Chief of Operations.
17. General Madkour Abu-El-Izz was recalled from an office as Governor of Aswan province to command the EAF on 11 June 1967 immediately following the defeat. Before his retirement from the Armed Forces in 1966, he had commanded the Egyptian Air Academy in 1954-1961 and then acted as CoS for the EAF. General Abdul-Monem Riad was attached to the Arab League as CoS of the Unified Arab Command. A few days before the 1967 War, he was sent to Jordan to command the Jordanian Army. On 11 June, he was appointed CoS for the Egyptian Armed Forces, a post he held until his death on 9 March 1969 during the War of Attrition.
20. Ibid., p. 57.
21. Ibid., p. 244.
25. Ibid.
26. Ibid.
27. Ibid., 30 September 1987.
29. Ibid.
30. Ibid., p. 55.
31. Ibid., p. 59.
32. Ibid., p. 104.
34. Ibid., 16 September 1987.
35. Ibid., 9 September 1987.
36. Ibid., 19 August 1987.
37. For an example, see Abu-Zikra, (1988), pp. 174-175.
38. The sentences against senior Egyptian Air Force officers were announced on 20 February 1968. Among those receiving sentence was General Sodki who was sentenced to fifteen years imprisonment. For public reaction, see Al-Ahram, Cairo, 22, 25, 26 and 28 February 1968.
40. Fawzi, (1984), pp. 64-65. Fawzi did not give details of aircraft instore during the October 1973 War. For the number of Egyptian aircraft in storage then, see The Military Balance 1973/1974, p. 31, 36.


44. Ibid.

45. In an interview with Mahmoud Ramadan - Sodki was his friend and the father-in-law of his daughter - London, 27 December 1987.


49. Fahmi, (1977), p. 87. This view was also expressed by many Air Defence officers during interviews.


51. Ibid.

52. Ibid., 16 September 1987.

53. Ibid.

54. General Fahmi had long been eager to establish a separate Air Defence Command. In 1965, upon his return from a specialized course in the Soviet Union, he had submitted a memorandum to the General Headquarters in which he suggested establishing a separate command for air space defence and included a structural layout for the suggested command. Fahmi, (1977), p. 91.

55. This is implied in the introduction to Abdul-Majeed Farid's book. He concludes that, after 1967, Nasser had become more suspicious of those surrounding him and of reports and information presented to him. Farid, (1979), p. 20.
56. See, for example, the summary of cabinet sessions chaired by Nasser in Farid's book. Farid, (1979).


58. Mr. Huwadły was Director of Public Intelligence before his appointment as a Minister of War on 11 June 1967. He was suspended from this position towards the end of 1967. On 20 January 1968, General Fawzi was nominated the new Minister of War. Fawzi, (1984), p.197.

59. Before the establishment of the Armed Forces Supreme Council in 1968, there was no regular military body that the President could meet to discuss military affairs. This Council consisted, when formed, of the CoS, head of branches in GHQ, Service Commanders, Corps Commanders, and District Commanders. It was chaired by the Minister of War, the C-in-C. Shazly, (1980), p.65.

60. In interviews with Marshal Gamasy and General Musallam, Cairo, 17 and 18 August 1988 respectively.

61. This is implied in Nasser's response to General Abu-El-Izz's complaint against the C-in-C that Fawzi had submitted his resignation because of him. Abu-El-Izz, 'Memoirs', Al-Liwa, 16 September 1987


63. Fawzi was one year senior to Nasser in the Military Academy and graduated in 1937. The two met again in 1950, when Nasser instructed Fawzi in the Staff College.

64. Heikal, (1975), pp.48-49.

67. Ibid., 19 August 1987.
69. Ibid., pp. 212-213.
70. Fawzi, (1984), p. 346; Abu-El-Izz, 'Memoirs', Al-Liwa, 30 September 1987. The term 'bourgeois' means that a socially privileged 'Air Force class' had emerged which was too closely tied to the upper class and out of touch with the people.
71. This is implied in the contradictory view of General Istavitsky, Soviet deputy Air Defence Commander, who visited Egypt one week after the departure of Zakharov. The view that he expressed to General Abu-El-Izz was that 'Air Defence [air space defence] in Egypt should remain under one command, with the Air Force, because of the limited resources'. He added that, 'Despite what Marshal Zakharov thought, the situation in the Soviet Union was different from Egypt'. Abu-El-Izz, 'Memoirs', Al-Liwa, 30 September 1987. The view that the Soviets supported establishing a separate Air Defence Command is also shared by most Egyptian officers.
72. According to one Soviet source, 'Individual Generals and high officers ... were not ready for fulfilment of their... duty. They were opposed to the main line of the government's policy directed towards conducting deep social transformation in the country. Using their official position, many of them actively opposed any kind of political work among the soldiers and non-commissioned officers which lowered the combat capability of the Egyptian Army'. Quoted in Glassman, (1977), p.67. According to this analysis, the Soviets believed that there were many senior Egyptian Army officers opposing the Nasser...
regime.

73. The Soviet view on the improvement of Egyptian command personnel complemented Nasser's own evaluation that Egyptian social inadequacies had been a prime cause of the 1967 War setback. In a 23 July 1967 speech, Nasser declared that before the 1967 War the 'Army class' and the bureaucracy had acquired 'unjust' privileges. Nasser, Al-Ahram, 24 July 1967. On Nasser's view concerning the reshaping of the officer corps, see Heikal, (1975), p. 48.


75. Abu-El-Izz, 'Memoirs', Al-Liwa, 26 August 1987

76. See for example, Ropelewski, 'Egypt assesses lessons of October War', Aviation Week and Space Technology, 17 December 1973, p. 16.


78. The failure to advance any kind of argument against the Air Defence Command may have been due to the weak position of Abu-El-Izz.

CHAPTER THREE

THE TIME FACTOR

Greatly influenced by the spectacular performance and comprehensive victory of the IAF in the 1967 War, the Egyptians focused on developing their ability to fight the Israelis in the air. In their Armed Forces reconstruction programme after the 1967 War, the Egyptians planned to maintain a balanced mix of aircraft and air defence weapons. Various factors interfered during the implementation of these plans, however, forcing Egypt to shift from this intended air strategy to heavier reliance on ground-based air defence. Two of these factors were of utmost consequence. First was the premature start of the War of Attrition, coupled with the Egyptian miscalculation of the Israeli response, namely, the full introduction of the IAF. The second factor was the Egyptian misjudgment of their ability to produce a large number of pilots in a short period of time. Under time pressure, and suffering from an air inferiority complex, the Egyptians overlooked many related factors in preparing skilled combat pilots, with the result that they could not achieve the goals of their air plans.

Background and Motives for the War of Attrition

Fifteen months after the disastrous defeat in the 1967 War, Egypt officially announced the start of 'The Policy of Preventive
Deterrence' ('Siwasat Al-Radi' Al-Wiqai). Announced in September 1968, this was an active defence policy aimed at forcing Israel to pay a high price for staying in Sinai, through inflicting heavy losses on its forces. This policy was suspended a month later, following the Israeli raid on Nag Hamadi in October 1968, only to be resumed once again in March 1969, starting what later came to be known as 'the War of Attrition'. (1)

The main reasons and motives behind the decision of the Egyptian leadership to start the War of Attrition have been a matter of controversy in the Egyptian literature. Some believe that the motivation was mainly political, and that Nasser aimed at exerting pressure on Israel and at bringing the Middle East conflict to the attention of world public opinion. Others think the decision was necessary for both political and military reasons. Most important among the latter were the desire to build up morale and accumulate combat experience. Indeed, some Egyptian officers and analysts consider that the War of Attrition for the first time created effective field commanders, a development they believe to be as important as the construction of the SAM belt along the Canal. (2) Still others think the war was dictated purely by domestic public pressure. (3)

A major reason for this controversy is that the decision to start the War of Attrition at that time may have been premature. Given the importance of the event, it is necessary to review the environment in which the decision was taken, and to discuss its impact on the
formulation of Egyptian air strategy and the ability of the Air Force and the Air Defence to achieve their assigned aims.

1. The Internal Setting. Three main internal dilemmas pressured Nasser to take the decision to launch the War of Attrition. These were: Security, the Economy and legitimacy of the Regime.

a) Security. Both geography and history have compelled Egypt to look to three fronts - one at sea and two on land - for its national security. With the end of the colonization era, the Mediterranean front became the least probable threat, especially during the long presence of the British forces in Egypt, with their Navy dominating the Mediterranean. This left the two land fronts. Throughout their history, the Egyptians have depended on the Nile, so the main concern of any administration in power was always to secure the flow of the river and prevent any alien intervention or diversion of its tributaries. Fortunately for Egypt, the political, economic and social circumstances, as well as the modest technological capabilities of the countries of the Horn of Africa, have reduced this threat. Egyptian-Sudanese relations through history have reinforced Egyptian security concerning the Nile. (4)

The Eastern front was different; to the northeast there was the land corridor between Asia and Africa - Sinai - which had always been the passage way of military campaigns to and from Egypt. (5) Since 1948, Egypt had been isolated from the Asian Arab countries by the creation of Israel, which became the main threat. In 1956, Israel
joined British and French forces in attacking Egypt, and captured the whole of Sinai. With the increasing build-up of Israeli military capability, the Egyptian leadership felt increasingly threatened, fearing the growing regional might of Israel. The 1967 War reinforced their fears: the war ended with Israeli forces 60 miles from Cairo. No matter who was actually in power, any Egyptian leader would find the occupation of Sinai intolerable and would constantly feel threatened by Israel.

b) The Economy. Besides its own distinctive problems, the Egyptian economy has suffered from the same symptoms and chronic problems attributed to the economies of the Third World countries generally. Nonetheless, it grew steadily in the few years preceding 1967. The June War put an end to this growth, and ushered in a critical economic phase. Egypt's economy was most affected by the closure of the Suez Canal, which resulted in the loss of an estimated annual income of over $300 million in duties.

Tourism also suffered from the War. Egyptian income from this sector before 1967 exceeded $100 million annually. The Egyptian Ministry of Planning estimated that the country had lost $84 million in the year 1967-1968. Moreover, the loss of the Sinai oil fields to Israel affected Egyptian production, and caused a loss of $50 million annually. Egypt was compelled to shift from exporting oil to importing it.
Adding to the economic problems was the fighting which broke out immediately after the 1967 War in the Suez area. Deliberate Israeli shelling destroyed oil refineries and other major installations. Just as seriously, it forced the evacuation of hundreds of thousands of Egyptian citizens from cities like Suez and Ismailia towards the interior. The total number of internal refugees eventually reached 1.5 million out of a population of about 30 million. (11) The cost to Egypt of evacuating and accommodating these people was around $278 million. (12) Military expenditure was an additional, major burden on the Egyptian economy. Estimates of war losses in the 1967 War vary between $1 billion and $1.5 billion. (13) These losses were compensated for, during the following three years, by Soviet weapons worth an estimated $2 - 2.5 billion. (14) Much of this was in long-term loans, but it still represented a significant burden.

Taken together, these various losses increased the pressure on the Egyptian leadership and led to a critical economic situation, pushing Nasser to seek the help of the Socialist countries in order to keep the Egyptian economy on its feet. (15) For Egypt to recover the lost resources, Nasser's immediate aim was to secure an Israeli withdrawal from Sinai. Realizing that a political solution was not on the horizon, Nasser judged that Egypt could not long sustain these losses, and was therefore, forced to exert military pressure on Israel to withdraw. The Egyptian leadership's judgement was that if Egypt could escalate the military situation in a controlled fashion, it would have a military advantage which would help to pressure Israel into accepting a political solution. This was thought to make it worth the
additional costs and risks involved in starting military operations. (16)

c) Legitimacy of the Regime. After the 1967 War, the credibility of the Egyptian regime was weakened. First, it had failed to protect Egypt's borders, enabling Israel to occupy Sinai. Secondly, the extent of the corruption and mismanagement in Egyptian institutions - especially the military - had been revealed to the public for the first time. Consequently, the Egyptian revolution of 1952, and its very philosophy and objectives, became open to question. (17) Nevertheless, the massive, spontaneous demonstrations on 9 and 10 June that erupted in support of Nasser and rejecting his resignation, expressed refusal to acknowledge defeat and insistence on continuing the struggle. This vote of confidence in his leadership significantly increased the pressure on Nasser to move towards liberating the Sinai peninsula. (18)

Despite this confidence in Nasser, the symptoms of political instability started to surface. After the 1967 defeat, the Egyptian Armed Forces remained fully mobilized, and stepped up training and military exercises. Conscription was applied universally and for longer periods, but university students and college graduates especially felt growing frustration because they were kept without fighting. Their treatment by Soviet advisers, who claimed that the Egyptian Armed Forces would be unable to resume fighting for a long time to come, contributed to this resentment. (19) On top of everything was the feeling of injured national pride. Egypt, which had posed as
the Arab World's leader and protector during the fifties and sixties, was not able to protect itself. This feeling was not limited to younger Egyptians only; the same outlook made Nasser hesitate to attend the first Arab Summit after the 1967 War in Khartoum, expecting gloating from his counterparts. (20)

Thus, the legitimacy of the political system was under question, and the feeling of public discontent increased. In February and November 1968, students and workers demonstrated and rioted in most Egyptian cities for the first time since the 1952 revolution. (21)

2. The External Setting. The influence of Egypt over Arab and African affairs in the fifties and sixties was greatly shaken by the 1967 War, as a result of the dramatic increase in dependence on outside assistance, especially Soviet. It was not only in the military field that Egypt became dependent on Soviet weapons, spare parts and advisers, but also in the economy, which became tied to the Socialist Bloc. Heavy reliance on the Soviet Union at this stage meant that channels of communication with the United States remained blocked. Indeed, the Soviet Union now became the interlocutor on behalf of Egypt in negotiating a peaceful settlement with the US. The loss of direct contact was a contributing factor to the failure of all peace initiatives in the Middle East until August 1970, in addition to the US attitude itself and to Israeli insistence at this stage on direct talks with Arab countries (refused as a matter of principle by Nasser). (22) Having accepted UN Resolution 242 and other peace efforts (Jarring, the Big Four Talks) but to no avail, Nasser concluded that
it was impossible to reach a peaceful solution without a credible military capability. This was best reflected in his phrase, 'What has been taken by force, can only be retaken by force'. (23)

The second form of Egyptian dependence emerged with the acceptance of financial assistance from conservative oil-rich Arab countries. It was decided at the Khartoum Arab Summit in August 1967 that Saudi Arabia, Libya and Kuwait would provide Egypt with an annual £95 million in compensation for its losses in the war. Nasser's agreement to pull Egyptian forces out of Yemen seems to have been the price he had to pay, a price that limited Egyptian influence over Arab affairs. Moreover, Nasser's own commitment, at the same conference, militarily to liberate Israeli-occupied Sinai added to the pressure on him to resume fighting. (24) He feared that the Arab countries might stop paying aid to Egypt if military preparations took too long without actual fighting. (25)

On balance, it seems that the Egyptian decision to start the War of Attrition was first and foremost for political and domestic considerations. There was also a military benefit in the opportunity for the Egyptian Armed Forces to embark on serious training, request and acquire advanced weapons, boost morale, obtain a large amount of vital information about Israeli forces through exchanging fire and sending Egyptian patrols behind enemy lines. Some of this information was essential to the subsequent crossing of the Suez Canal in 1973.
A core question is whether the Egyptian Armed Forces were prepared for a reopening of armed hostilities at this time. Immediately following the 1967 War, they had initiated a process of reorganization that had had to start from almost nothing. As Fawzi expressed it, 'We started from zero'. (26) The early launch of the War of Attrition cut short the time available for unit training. For example, according to the former Egyptian Defence Minister, Marshal Gamasy's experience, preparing an armoured division to combat standards would require seven years: four years for organizing and crew training and three years for collective training. (27) In fact, the problem of the Egyptian Armed Forces was not in obtaining new types of weapons and equipment - although a few new weapons were introduced, most had already been in service previously - but rather that these forces had been poorly prepared before 1967 and needed hard training to raise operational standards. With regard to the Air Force, it is obvious that the 15-month period after the 1967 War was not enough to produce new pilots to take part in the War of Attrition. This was despite the fact that the Egyptians had adopted a shorter pilot training programme, which they hoped would produce pilots in 18 months. (28)

In light of these considerations, the decision to start the War of Attrition was premature, because the various services of the Armed Forces still suffered serious shortcomings in their training, armament and general preparedness. In the event, Egypt survived the War of Attrition and arguably made certain gains (construction of the SAM Box, involvement of the USSR in the defence of Egypt, acquisition of massive new arms deliveries), but the manner in which it was obliged
to wage that war had a profound effect on its organization and operational doctrine in the long term. More specifically, the experience affected the balance between the Air Force and Air Defence.

**Egypt's Air Plans**

Immediately after the 1967 War in which Egypt lost about 85 percent of its air war weapons and equipment, the Egyptian command sought a quick military reconstruction plan. In their three-year programme (1967-1970), the Egyptians planned to have a balanced combination of aircraft and anti-aircraft weapons. In the Air Force, they planned to have a total of 600 combat aircraft with 800 pilots in addition to two brigades of transport aircraft (each brigade consists of two squadrons and each squadron operated about 15 aircraft), five brigades of helicopter aircraft and 120 training aircraft. (29) In the Air Defence, their target was to form eight air defence divisions each consisting of three to five brigades of light or heavy anti-aircraft guns and SAMs. The number of SAM batteries that the plan called for is not known for certain, but according to Fawzi's account that the number of SAMs in 1971 was four times the number originally planned in 1967, the planned number could be estimated at around 34 batteries. (30) As noted earlier, this composition of air weapons was judged by the Egyptian military command to be balanced.

Egypt was able to recover 60 percent of its June losses in aircraft and air defence weapons by the end of August 1967. (31) This quick recovery was possible for two reasons: Firstly, most of the Egyptian...
losses in aircraft and air defence weapons were not matched by similar losses in crew; aircraft were destroyed on the ground, and most air defence systems were left behind in Sinai as a result of the sudden order for withdrawal. (32) Secondly, resupply by the Soviet Union, Socialist countries and Arab countries was quick. (33)

Towards the end of 1968, the Egyptian Armed Forces completed most of their rearmament and reorganization plans. Indeed, at the beginning of 1969, Egyptian targets in their plan regarding the Air Defence were reached (see Table One). The Air Force did not, however, achieve its target; it reached only half of its planned strength and acquired fewer than half of the required pilots. Despite this, Nasser believed that his forces were now not only capable of defence, but could also launch operations across the Canal. He thought that the shortage in equipment would, however, limit offensive capability beyond that, and so the Army would be unable to march into Sinai after the crossing because Egypt still suffered from a shortage of pilots. Nasser admitted that Israel was still superior in armour and air capabilities. (34) However, it seems that his evaluation of Egyptian defence capabilities encouraged him to submit to the political and economic pressures to begin operations. This was expressed in his announcement of the new policy of active defence (the War of Attrition).

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### Table-One(35)

**Air Force/Air Defence Strength**

**Targets and Achievements**

<table>
<thead>
<tr>
<th></th>
<th>Target set in 1967 to be achieved by 1970</th>
<th>Mid 1969-beginning of the War of Attrition</th>
<th>Mid-1971- end of the War of Attrition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total combat aircraft</strong></td>
<td>600</td>
<td>352</td>
<td>653</td>
</tr>
<tr>
<td>M1G-21</td>
<td>100</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>M1G-17/19</td>
<td>120</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Su-7</td>
<td>90</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>Il-28</td>
<td>30</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Tu-16</td>
<td>12</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td><strong>SAM batteries</strong> (about)34</td>
<td></td>
<td>30</td>
<td>145</td>
</tr>
<tr>
<td>SAM-2</td>
<td>180</td>
<td>420</td>
<td></td>
</tr>
<tr>
<td>SAM-3</td>
<td>-</td>
<td>260</td>
<td></td>
</tr>
<tr>
<td>SAM-6</td>
<td>-</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>
At the end of the War of Attrition in 1971, the Egyptian Air Defence had expanded well beyond the original size planned in 1967. In contrast, although the Air Force had reached its planned strength in aircraft, it had failed to produce the required number of pilots. We do not know how many pilots there were every year, but we have indications from various sources that, in 1971, Egypt still had a pilot shortage: first, Nasser admitted in his statements in 1969 and 1970 that Egypt still suffered from a pilot shortage. (36) Second, given the fact that, in 1971, about 100 Egyptian MiG-21s were flown by Soviet pilots, and that, according to present Egyptian Vice-President Marshal Abu-Ghazala, Egypt never had a pilot-aircraft ratio of 1:1, the number of Egyptian pilots in 1971 would be fewer than 550 (about two-thirds of their target). (37) The impact of the time pressure and the course of the War of Attrition interfered in the implementation of both Air Force and Air Defence plans, leading to a new balance of capabilities.

In 1971, the Air Defence became the strongest Egyptian arm, while the Air Force remained weak. The following sections explore the manner in which time pressure and the war events influenced the plans of the Air Defence and the Air Force, and consequently their structure.

The Egyptian Air Force (EAF)

Aside from the generally defensive nature of Soviet-made aircraft in the Egyptian inventory - a matter which will be discussed further below - the EAF reached its planned strength in aircraft by the end of
the reconstruction programme, but the Egyptian effort to produce the planned number of pilots failed. The pilot production plan was too ambitious to be achievable even in peacetime. The War of Attrition complicated matters further for the Air Force and prevented the achievement of its objective.

Pilot shortage was (and remains) a chronic problem which placed the EAF at a significant disadvantage from the sixties onwards. (38) Part of the problem was the limited capability of the Egyptian training system to produce more pilots. Before 1967, the annual influx of new recruits equalled the number of pilots leaving the service for different reasons. According to General Fawzi, the Air College was producing about 50 pilots every year, which was equal to the attrition rate of pilots through retirement, dismissal, suspension from flying and fatal accidents. (39)

After 1967, and under pressure of time, the Egyptians planned to have 800 pilots by the end of 1970, and aimed eventually at a pilot-aircraft ratio of 1.5:1. (40) The basic assumption of Egyptian planning was that the Air College should be able to produce a minimum of 200 pilots a year in three batches, each of about 60 pilots. (41) In fact, they aimed to continue beyond the 1970 target and hoped to graduate 1,000 pilots within five years, of whom 500–600 would be fit and combat-ready, each having an average flying experience of 600 hours. (42)
Considering that Egypt had about 250 pilots immediately after the 1967 War, and that one-fifth of that number (50 pilots) was leaving annually, the number of pilots (estimated at 100) expected to graduate from among the cadets recruited before 1967 would only compensate for some of those leavers. The number of new pilots required to graduate in the three-year period to achieve the figure of 800 pilots, and to match the number of leavers in this period, would be about 600. In fact, if the number of people leaving each year remained at the same ratio (one-fifth), the Egyptians would have to produce even more pilots to match the increased number leaving resulting from the gradual increase in the total number of pilots. Furthermore, even if the target of 800 pilots was reached in three years, the number required each year to maintain the same level would be 160 pilots. Thus, the EAF squeezed the duration of pilot training to a minimum, over-stretching their training capability and underestimating the related factors.

**Egyptian Training Capability under Time Pressure**

The Egyptian flying cadet, prior to the 1967 War, needed three years of training before graduating as a pilot. In the first year, the cadet used to receive his military training in the Army Military College, after which he joined the Air College. The flying training consisted of the following three phases:

1. Basic propeller flying on Al-Gomhouria aircraft for an average of 70 flying hours.
2. Basic jet flying on IL-29 aircraft for an average of 120 flying
hours. (46)

3. Advanced flying on MiG-17 or Su-7 aircraft for an average of 70 flying hours.

Immediately after the 1967 War, however, this programme was abandoned and the preliminary year at the Military College was cancelled. According to the new training programme, the Cadet had to undergo 45 days of intensive military training at the Air College to be followed by his flying training. The third phase of flying training was moved to the fighter squadrons, to which the Cadet would be transferred upon graduation from the Air College. The Egyptian command hoped that adopting this programme would enable them to graduate pilots in 18 months.

The new Egyptian training programme was faced with four main obstacles: lack of flying instructors, the social and technological background of candidates, training areas, and logistical and communication problems. The first two factors were the most influential since they were related to the most basic elements in the training process, that is, the instructor and the student.

a) Increased Demand for Flying Instructors

The new plan created a huge demand for flying instructors, as the duration of training and the number of flying instructors needed are inversely correlated. If it was to produce more pilots sooner, the EAF
would require more instructors. In this respect, the Egyptian plan seem to have been over-ambitious.

The new training programme proposed three intakes every year, each consisting of 300 cadets. In the first phase, each student had to fly 70 hours within about six months, a total of about 3,500 flying hours a month. Considering that one third of the students would be dropped from the course at various stages in the phase, there would be a saving of an average of about 600 flying hours a month, and 2,900 hours remaining as a monthly target. (47) In a similar way, the second flying phase, involving 120 hours for each student within a year, would require an additional 1,800 flying hours a month. (48) This made the total target for the Air College 4,700 flying hours a month, which requires a huge number of instructor pilots. For the purpose of illustration, using the standard procedures in the Royal Jordanian Air Force as an example, achieving this target would require 118 instructors. (49) This represented at least one third of the EAF's total number of pilots. (50)

In fact, in order for the Egyptian Air College to carry out its new programme, the need for instructors would be even greater for two reasons: first, the cadets who were flying at different stages in the Air College when the 1967 War broke out needed additional instruction to reach graduation. Second, according to the new plan, since there were three courses per year beyond 1967, the requirements for basic training were doubled and the requirements for the advanced stage were tripled, causing an overlap problem (see Figure Three).
First phase

Continuous overlapping of two courses starting from 1st Nov. 1967.

Second phase.

Four months overlapping with the second intake starting from 1st May 68.
Continuous overlapping of three courses after 1st Sep. 68.

Figure Three
Pilot Training - Courses Overlap
Although flying instructors do not have to fly all these flights but only about 75 percent of them, their presence is required for safety reasons.\(^{(51)}\) As such, even utilizing ground instructor pilots and pilots in administrative jobs in the College would be insufficient to fulfil the task on time. Increasing flying days by cancelling leaves, and increasing the number of sorties for instructors to three per day each would produce limited benefits and could be counterproductive.

The new Egyptian pilot training plan was designed by EAF Commander General Abu-El-Izz. Formerly head of the Air College from 1954 to 1961, and so considered a training specialist, he must have been well aware that the plan made an increase in the number of instructors imperative. Clearly, to achieve the new plan would barely have been within the EAF's capability even in peace time, unless it were to divert most of its pilots to training roles. As it was, however, Egypt was at war, and the Air Force had to undertake certain operational requirements. Thus the plan could only be implemented with the help of instructors recruited from outside the Air Force and outside Egypt.

A corollary problem was not only how to amass a large number of instructors, but how to qualify them for their task. The number of instructors required by the training plan would form such a high ratio to combat pilots that it would be unprecedented in any air force. Consequently, the EAF would either have to accept lower standards of instructors, or train more of them, which also consumes time and itself gives rise to even greater demand for instructors.
Realizing that the new training programme was behind schedule, the Egyptians requested Soviet instructors. There were already 56 Soviet pilots acting as advisers in the EAF, so Nasser now asked that some be converted to training. On 5 May 1968, he confirmed that the USSR had also agreed to bring the number of Soviet pilot instructors up to 120. In Nasser's view, 'This number of Soviet instructors would enable us to train the required number of pilots'.

The EAF also recruited Indian flying instructors, to the extent that almost all flying instructors for the first flying phase in the Air College in 1969 were Indians. Needless to say, the increase in pilot cadets and instructors in the Air College put a tremendous pressure on the administration to provide essential services, with a direct effect on the training process. Although, with this number of foreign instructors, the Egyptians could in theory have met most of the Air College needs, other constraints complicated the training process.

Training a pilot to fly a jet fighter does not mean he is ready for operations. More experience on the type of aircraft, intensive training on its weapon systems, and more experience in air combat tactics are what make a pilot combat-ready. According to the new Egyptian training programme, pilots were transferred to squadrons for their third phase of training. For example, graduate pilots who were selected to fly Su-7's would start a full conversion course, including tactics, on an Su-7 squadron for about 120 hours, followed by another course in 'Asrab Attaqiyah' (reinforcement squadrons) to improve fighting skills for about 70 hours. As in the first two phases, the need for instructors in the squadrons for the third phase was also
great. According to the new plan, 200 Egyptian pilots would graduate to the squadrons every year for training on type. Assuming a 10 percent fail ratio in this phase, about 36,000 training hours would be needed for each year's graduates.

Egyptian pilots would be classified as operational upon finishing these specialized courses. (54) This meant that Egyptian pilots newly classified as operational had less than 200 hours 'on type' (flying a single type of fighter aircraft) and a total flying experience of less than 400 hours. Egyptian figures were low compared with standards in other countries, mainly due to the time pressure. According to the Commander of the Royal Jordanian Air Force, for example, a combat-ready pilot should have a total of not less 500 to 600 flying hours, including at least 300 hours 'on type'. He estimated the time needed to achieve this experience at five years. (55)

The need to graduate more pilots in a short time forced the Egyptians to change their training method. The cadet now went from flying the basic jet (Il-29) straight to specialized training on combat aircraft in the squadrons. This led to less emphasis on some fighting skills. For example, if a pilot was transferred to an Su-7 reconnaissance squadron, most emphasis in his flying training would be on low level flying, navigation and ground attacks, with less emphasis on air combat tactics. (56) This situation created more problems for the Egyptians. Su-7s already needed air cover because of the role and limitations of this aircraft, and the lack of air combat skills of Su-
7 pilots would make them even more vulnerable when forced into such action.

b) Social and Technological Standards

Egypt, like most Third World countries, suffers from low levels of individual income, high illiteracy rates and poor health conditions. Considering that any air force depends primarily on pilots enjoying good psychological, mental and physical health, the Egyptians had problems in this respect. In the first phase, requirements regarding educational level, age and motivation would reduce the slice of the population eligible for application to a minimum. Many potential applicants would be refused for failing to meet physical criteria related to height, weight and body proportions (length of limbs and so on). During the psychological and health tests, large numbers were filtered out.

Egyptian officials admit that these kinds of problems were the main obstacle hindering their effort after 1967 to produce more pilots in a short span of time. Some officials go as far as to consider this problem the main one facing the Air Force even now. According to former Egyptian Defence Minister, Marshal Abu-Ghazala, 'Only one in every 1000 candidates would pass through the aptitude and medical tests in Egypt'. He added that it is for this reason that not one Arab country has been able to achieve a pilot-aircraft ratio as high as, let alone better than, 1:1. This includes Egypt, which barely enjoys a 1:1 ratio at present. (57) In discussing the relationship between
social and technological levels and air power, retired General Talaat Musallam pointed out that these levels differ from one country to another. Israel may be classified among the advanced industrialised countries. Commenting on the ability of Third World countries, including Egypt, to produce pilots, he noted that one in every million of the population could become a fighter pilot every year. (58) Since the Egyptian population in the period between 1967 and 1973 was around 35 millions, this implies that Egypt was already doing well to produce 50 pilots a year, and that expanding this to 200 a year would prove highly problematic.

The nature of air power makes it heavily dependent on the latest industrial and scientific achievements. Until the late sixties and early seventies, the advanced machines that air forces used were the product of advanced industrialized countries - mainly western ones; consequently, operating and maintaining them required similar levels of skills in the recipient countries to those of the manufacturers. But because Third World countries have lower technological levels, operating and maintaining these weapons requires longer pilot training with special emphasis on applied sciences, even if individuals have basic flying abilities.

People in Third World countries generally have less experience with machines than in advanced countries, and do not get acquainted with them at early stages of their lives. While a child in western countries is used to dealing with different kinds of machines which develop his mechanical skills, this is not always the case for an
Egyptian child. One of the most interesting views regarding the difficulties in improving Arab fighter pilot standards is that of General Shurdom, Commander of the Royal Jordanian Air Force. Using an extreme analogy for effect, he said, 'It is impossible that a young man in our part of the world should move from riding a camel to riding a sophisticated fast jet without passing through riding a car at least'. As he explained, many flying cadets in a country like Jordan come from farming or nomadic families, who have never had the chance to see machines or operate them. In speaking with new cadets, he observed that most individuals of their intake had never flown in any kind of aircraft (even as a passenger) in their lives. He added 'This is the quality we have to train to fly the most sophisticated machines'.

Training Areas.

The Egyptians also faced the problem of overcrowded training areas. This problem did not stem from the small size of Egyptian skies, but from the Air College location only 50 miles from the Suez Canal. The dramatic increase in the number of training sorties per day caused congestion, especially as the slow-speed training aircraft had to operate in nearby areas, so as not to waste time in coming and going. Given the safety factor, there are limitations on the number of aircraft that can fly within the same zone at the same time. Safety is even more problematic in training areas than in other types of flying. In training, a variety of exercises require frequent changes in height and direction, which presents additional problems for air space.
management. The Egyptians did, however, take advantage of their favourable weather and spread their sorties evenly throughout daylight hours. (60)

d) Intensive Training, Maintenance and Communication Problems.

To intensify training under time pressure would no doubt lead to less comprehension by students, in turn leading to more cases of failure (or to lower standards). The Egyptians assert that they were strict in their standards during this period. But given the fact that the success ratio among cadets in 1967-1973 stayed at the pre-war level of 35 to 50 percent despite the pressures and condensed training programme, the Egyptian claim that standards were kept just as high is hard to accept. (61)

Complicating matters further, Egyptian student cadets also faced a language problem. Most instructors for the first phase were Indians, who used English, while some of the second phase instructors were Soviets, compelling the students to use three languages altogether. This caused many communication problems which affected the training process and at times caused fatal accidents. (62)

Intensified training also put more pressure on maintenance services. In addition, the shortage of advanced training aircraft forced the Egyptians to utilize available ones to their maximum. (63) This being the case, it is reasonable to expect lower levels of
maintenance, leading in turn to greater probability of flying accidents.

In conclusion, problems like those of over-intensification of training, over-crowded training areas, language and communication difficulties, and lower levels of maintenance would no doubt lead to higher probability of losses in training. Although the Egyptians generally decline to discuss this point, General Fawzi has admitted that, during the three years 1967-70, the EAF suffered more losses in training than in combat - 83 aircraft were lost in training. (64)

The Impact of the War of Attrition on the EAF Rebuilding Programme.

The War of Attrition caught the EAF in the process of launching a number of urgent programmes. In addition to the task of producing new pilots in far greater numbers than before and retraining available pilots, the EAF was establishing new air bases, adding new runways to old ones and opening new landing strips, with all their associated services. It had also started to construct shelters for aircraft, along with constructing underground operational centres. (65)

Upon the start of the War of Attrition, the focus of the EAF shifted from concentrating on training alone to include operations as well. Despite the insistence by a number of military decision-makers at the time that the Egyptian plan was to avoid committing the Air Force on a large scale to the War of Attrition, it could not avoid a high degree of alert. (66) As the initiative in the air was in the
hands of the Israelis, Egyptian air action was in effect dictated by Israel, meaning that the EAF had to be on continuous full alert. Moreover, the heavy burden of air combat during the War of Attrition fell almost entirely on the shoulders of the Egyptian pilots remaining from the pre-1967 generation. Although these pilots had suffered only light losses in the 1967 War, the post-war recriminations and military trials, as well as the reorganization process itself, also took a toll on them. (67) Allowing the EAF to take a greater part in the war resulted in increased pilot losses, at a time when it had failed as yet to add substantial numbers of new graduates to its qualified cadre. (68) This situation dictated the Egyptian command's decision to refrain from throwing the Air Force into battle against the Israelis over the Canal zone at any time during the war. (69)

Of more significance was the impact of the War of Attrition on the EAF's pilot production programme, as most instructors were now needed for operations as well. But, unlike instructors for the third phase of cadets' training in the squadrons, the majority of instructors in the Air College were not of operational value. They were needed full time in training, and so even if fighter or fighter-bomber aircraft were based at the College or close by, to spend time flying them (for combat or refresher training) would further delay training. It is also difficult to maintain a high degree of proficiency on two types of aircraft at the same time. Secondly, it was difficult to anticipate the timing of air operations at the beginning of the War of Attrition, making it impossible to make use of flying instructors for combat missions as well. (70)
The start of the War of Attrition had most effect on the third phase of cadet training as instructors in the squadrons were supposedly the most qualified on their fighter aircraft and did not need time to convert to operations. The EAF could not afford to pull out too many fighter instructors and devote them completely to training, with the result that pilot instructors in the squadrons were doing combat missions along with training missions. (71) This delayed the training process and stretched the duration of the whole programme.

With the start of the War of Attrition, the training areas were no longer secure. To solve this problem, the Egyptians sent sections of the Air College and cadets to train in safer bases far away. Marsa Matrouh air base, 270 miles west of the Canal, and Kana airfield in the extreme south of Egypt were used. (72) This situation created control and coordination problems, besides maintenance and administrative ones. The Egyptians worked hard to overcome these problems and keep the training going. (73)

Training safety may have been the main reason behind the EAF's acceptance of the opportunity to send cadets to the Soviet Union. (74) However, this approach was a failure and was discontinued after the sending of one batch of cadets who spent a year in the USSR. These cadets came back with far fewer hours than their colleagues in Egypt had acquired in the same period. (75) This was mainly due to the vagaries of Soviet weather, where so many days are useless for flying.
The start of the deep penetration raids by the Israeli Air Force in January 1970 made all training areas in Egypt unsafe. With the increase in the number of Israeli F-4s (Phantoms) and their ability to reach every point in Egypt, the Egyptian command decided to use Libyan air bases for training. (76) The manner in which the Israeli introduction of their Air Force into the War of Attrition affected the EAF operational concept will be discussed in the following chapter.

In conclusion, the Egyptian effort to produce pilots did not meet the stated objectives of the plan. The Egyptians admit that, out of 13 batches, the Air Force produced fewer than the planned 1000 pilots, and even then in six years rather than the five-year period originally set. (77) In fact, no more than two intakes a year were recruited and the graduation time was extended beyond the 18-month period. (78) The Egyptians, under time pressure, overlooked many related factors which made this plan beyond their capability. The War of Attrition interfered with the preparation of pilots and imposed time delays, with the result that the Egyptian leadership started in 1970 to realize that producing pilots takes a longer time than it had thought. (79) Thus, General Fawzi's claim that the Egyptian plan had achieved 75 percent of its goals by the end of 1970 is hard to accept. (80) In particular, he contradicts other sources and ignores the fact that in order to fly their MiG-21s, the Egyptians were forced to seek the help of Soviet pilots in 1970 and North Korean pilots in 1971. (81) General Musallam summarizes the lesson best: 'The decision to expand an air force involves much more than the political decision to do so'. (82)
Egypt had a considerable air defence force on the eve of the 1967 War. In addition to the organic combat formations' air defence battalions (estimated previously at eight to nine battalions), there were 55 battalions of anti-aircraft artillery (most of which were 37, 57 and 100 mm. calibre Soviet guns) organized into two divisions. Furthermore, there were 29 companies equipped with 14.5mm heavy anti-aircraft machine guns, and 27 SAM-1 and SAM-2 battalions, the latter located in five main areas. (83) Egypt lost many of these weapons during the 1967 War, but with far fewer losses in their crews. Losses in the SAM battalions in particular were minimal due to the fact that only three battalions were deployed in Sinai (and hence overrun).

Immediately after the 1967 War, thanks to the rapid Soviet resupply of weapons, it was possible for Egypt to regroup and reorganize the air defence forces with remarkable speed. Furthermore, the three-year reconstruction plan for the Egyptian Armed Forces included an expansion plan for air defence. As noted earlier, the Egyptian command planned to have eight air defence divisions by the end of 1970, each consisting of three to five brigades of light and heavy anti-aircraft guns and missiles, in addition to eight battalions of control and reporting radars. Each division would control the observation units within its sector, and all sectors would have their own operation centres. This plan was later changed, however, as the Egyptians decided to form additional SAM battalions using new types of missiles and to acquire new, and more, low level radars by the end of 1969. (84)
Implementation of the original expansion plan started soon after the 1967 War. The numerous new air defence formations were equipped with new weapons: 85mm radar-guided anti-aircraft guns, ZU-23-2 guns, and shoulder-held SAM-7s. Moreover, adding to their small number of western anti-aircraft weapons, the Egyptians acquired the 0.5 in. calibre anti-aircraft machine gun obtained with the help of Jordan. (85) The Egyptian effort in forming and training new air defence units was facilitated by the completion of a separate Air Defence Command dedicated to this task. Rapid expansion may have led to the Egyptian leadership's strategic evaluation by the end of 1968 that it had sufficient air defence weapons to defend both the front and the interior with its heavily-populated cities. (86) The Egyptians did not discover how exposed their skies were to the IAF, and how inadequate the air defence force was to protect all vital targets in Egypt, until it was put to the test. (87) Discovering this fact in the heat of war put them under greater pressure to search for immediate solutions. Given the fact that the Air Force was inadequate for this task and was not likely to be ready for some time yet, the time factor favoured more expansion in the air defence forces as the only viable option available at short notice.

Preparing crews for the anti-aircraft gun battalions of the air defence force did not pose a problem for the Egyptians. Their conscription law obliged tens of thousands of young men to serve in the Armed Forces without any return commitment to end their service on time. Among the conscripts, thousands of university and college graduates were recruited for the air defence. Both numbers and skills
were available, facilitating the formation of new units. Also helping this process was the fact that physical requirements for air defence operators were relaxed (in contrast to the Air Force), enabling the Air Defence to absorb more conscripts.

The bulk of Egyptian air defence forces were anti-aircraft artillery battalions, most of which were equipped with obsolete Soviet weapons like the 37mm, 85mm and 100mm guns. (88) Their simplicity reduced the need for high operating skills, and similarly to field artillery, each crew member undertook a single separate task. This meant that large crews were needed to operate each gun. For example, the 130mm, 100mm and the 85mm guns required 11, nine and seven men to operate them respectively. (89) But given the low-skill needs of these weapons and relatively long experience with them, the Egyptians could train large numbers of operators and so form more anti-aircraft units in a short span of time.

The Egyptians believed that all Soviet air defence weapons, including missiles, were less sophisticated than similar western ones. One former Egyptian Defence Minister suggests that the simple Soviet weapons were designed mainly to suit Russian peasant operators. Technical simplicity also suited the Egyptian operators of average education, who were able to grasp operational instructions within three to six months. (90) In this way, the Egyptians were able to train thousands of operators and to exceed the target set in the original plan of 1967 for the eventual size of the Air Defence. (91)
Soviet air defence systems required larger crews for operation than western ones. Emphasizing this point, Marshal Gamasy refers to the SAM-2 battalions, which each needed 280 personnel to operate, while a fire section of French Crotale missiles, for example, engaging the same number of targets, requires only 15 men. Although his example contrasts different categories and generations of SA missiles and exaggerates the manpower in SAM-2 fire sections, it nonetheless highlights a major reason for the huge increase in Egyptian Air Defence manpower, estimated at 75,000 men by 1973. (92)

On 20 July 1969, the Israelis fully introduced their Air Force into the War of Attrition in a sustained offensive which lasted until the ceasefire in August 1970. During the second half of 1969, the IAF continuously attacked missile sites, radars and anti-aircraft artillery in an effort to cripple the Egyptian air defence system. Towards the end of 1969, it became clear to the Egyptians that the IAF was winning the battle against their air defence. In reassessing the military situation, Nasser chaired a series of meetings, between 6 and 10 January 1970, for Egyptian top military commanders. Admitting the success of the IAF in negating the air defence in the Canal zone and the inability of the EAF to intervene, the Egyptian leader judged that the only alternative open to Egypt at the time was to keep on fighting regardless of the heavy losses, simultaneously trying to expand the air defences and increase EAF participation. They decided, moreover, to exert more pressure on the Soviet Union to supply the required air defence means according to new Egyptian plans. (93) The start of Israeli deep raids into Egypt in January 1970 helped the Egyptians to
persuade the Soviet leadership of Egypt's urgent need for more and modern air defence means. The Soviets decided on 24 January 1970 to provide Egypt with 32 SAM-3 battalions with Soviet crews, in addition to about 95 MiG-21's with their Soviet pilots. (94)

The Egyptian decision to shift to greater reliance on ground-based air defence was based on their judgement that, under the pressure of heavy casualties and the drain on the economy, they had no other option but to achieve some kind of strategic balance quickly. The EAF needed a long time to produce a new generation of pilots. Their plan to produce a large number of pilots to remedy the chronic problem of pilot shortage proved defective because it was beyond their capability in the first place. The War of Attrition hindered the training process, imposed time delays, and inflicted more losses on the few pilots available. Consequently, as Egypt had failed to achieve parity using its Air Force, air defence would have to redress the balance. Only if it was successful could Egypt display flexibility towards political initiatives aimed at ending the war, as it could then negotiate from a reasonable position of strength. (95)

It seems that the main consideration in the Egyptian strategic decision to rely on ground-based air defence was the time factor; specifically, the short time needed to prepare air defence crews was, according to many Egyptians, the decisive factor influencing the choice. (96) The familiarity of Egyptians with the SAM-2 since 1962 and the availability of SAM-2 crews (either under training or those who had recently lost their equipment in the Canal area) may well have
influenced the shift to an air defence solution. Moreover, the Egyptians built up a formidable air defence force in the 1967-1970 period and acquired extensive combat experience of air defence weapons, encouraging further investment in the same field (see Figure Four).

Senior Egyptian officers now argue that the economic aspect was a major consideration in the decision to shift to air defence. According to Egyptian sources, each battalion of SA-2 missiles cost Egypt £25,000 ($8000) in 1969, whereas the MiG-21 fighter aircraft cost £750,000 (about $250,000). (97) (Although the cost of a SAM battalion seems to have been underestimated by Egyptian sources, it would, nevertheless, still have been cheaper than an aircraft.) This logic is understandable despite the large crews required to operate and maintain missile battalions, in light of lower operating costs in Egypt. Nevertheless, it is doubtful whether the economic issue did influence the Egyptian decision to shift to air defence. This conclusion is based on the following three reasons: first, the Egyptians acquired the planned number of aircraft stated in their reconstruction plan, and the limitation on additional numbers was not based on financial factors but rather on their capacity to produce pilots to fly them. Second, there is no evidence to suggest that Egyptian decision-makers at the time raised the economic issue regarding Egyptian acquisition of weapon systems. Third, the relaxed repayment arrangement for Soviet weapons was such that most Egyptians used to believe that Egypt was allowed to obtain all Soviet weapons free. This view is confirmed by General Fawzi, who adds that, until
Figure Four

Weapons Buildup

Aircraft - SAM Launchers

- Aircraft
- SAM Launchers

On the eve of the 1967 War  |  Mid-1969  |  Mid-1971  |  On the eve of the 1973 War
1971, Egypt had repaid none of its military loans to the Soviet Union. (98)

Towards the end of 1969, however, the new Egyptian Air Defence plan called for the introduction of SAM-3s, but in larger numbers than originally planned—-a four-fold increase in SAM battalions, in fact. (99) Upon the surprise Soviet decision in January 1970 to provide Egypt with 32 SAM-3 battalions, the Egyptians faced the problem of recruiting qualified operators. In contrast to the mass of anti-aircraft artillery requiring low skills and for which manpower was readily available, and to the limited number of SAM-2s that required higher skills but for which sufficient operators could be found among veteran soldiers and college conscripts, the SAM-3s required new skills in large numbers, at short notice. Thus, although the three-month training period on the new weapons was roughly the same as for the SAM-2s, Egypt's problem was that it no longer had a ready pool of semi-qualified manpower.

It was indeed remarkable, therefore, that Egyptian efforts succeeded in amassing the required number of SAM-3 operators in 1970. More air defence training centres were opened, with both Egyptian and Soviet instructors (from among the Soviet advisers). Additional interpreters—Soviets and Egyptians—were assigned to assist in this task. The pressure of time also compelled the Egyptians to send in turn three SAM brigades with their full staff (3500 men each) for three months training in the USSR. (100) Egypt's problem in recruiting qualified personnel aroused Soviet doubts about its ability to absorb
the quantities of weapons it was ordering, in such a short time. At a meeting in the Egyptian Air Defence Headquarters in early 1970, according to General Musallam who attended it, Nasser responded to the Soviet advisers: 'I will recruit university professors if necessary to provide crews for air defence weapons'. (101) Eventually, the effort paid off and the Egyptians were able to activate 32 SAM-3 battalions: they constructed all the sites in just 40 days and prepared crews for the entire SAM-3 division in about two years. (102) This was the 8th Air Defence Division which entered the SAM 'box' along with the new ZSU-23-4 systems that now reached Egypt.

Recruiting engineers and university graduates in great numbers saved the Air Defence some of the long training needed for technicians and maintenance personnel. For their part, missile operators did not need as much training anyway: courses for operators varied between 12 and 15 weeks. Preparing commanding officers for SAM battalions did not generally take a long time either. Taking the time scale for preparing battalion and company commanders at present for reference, we find that the duration of 'senior' battalion commander courses (various specializations) varies between 18 and 26 weeks, and advanced courses for missile company commanders vary between 11 and 15 weeks. (103)

In the last three months of the War of Attrition, the Egyptians and Israelis entered a race against time. The Israelis were determined to prevent the Egyptians from constructing a wall of missiles along the Canal, while the Egyptians persisted in constructing those SAMs. The Egyptian success in constructing the SAM box was not without
sacrifices: ten thousand Egyptians died during the War of Attrition, among whom were as many as 6,000 civilian construction workers, contracted by the Armed Forces to build air defence sites. (104)

Conclusion

The Egyptian plan for the Air Force — providing 800 pilots in three years — proved to be over-ambitious and unrealistic. They overlooked many training-related factors like the need for instructors, training areas and the social factors. The early start of the War of Attrition had direct negative effects on the Egyptian Air Force, most important of which was to interfere in the training process, imposing further delays and inflicting heavy losses on the few available qualified pilots. Faced with this crisis and under the pressure of the Israeli attacks, the Egyptians shifted to rely more on the air defence. The air defence weapons were relatively easier to absorb in large quantities and offered a quick solution to the Egyptian need to neutralize the superior IAF. Moreover, the lower overhead costs of the air defence weapons may have encouraged Egypt to shift its air policy. The Soviet decision to send large quantities of defensive weapons to Egypt early in 1970 accelerated this shift towards air defence.
References

1. This new Egyptian strategy of active defence was announced for the first time in an Egyptian military communique on 8 September 1968, (Al-Ahram, 12 September 1968). For the debate over the issue of resuming operations after their suspension, see Farid, (1979), pp.120-121.

2. This view was most strongly emphasized by Sayed Yaseen, Director of Al-Ahram Centre for Political and Strategic Studies, in an interview in Cairo on 17 August 1988.

3. Examples of those who believed it was mainly for international political reasons are General Jamal Mathloum, Director of the Armed Forces Centre for Strategic Studies (interviewed in Cairo, 24 August 1988), and Egypt's Foreign Minister during the War of Attrition, Mahmoud Riad. See Riad, (1985), pp.170-209. An example of those who believed it was for political and military reasons is General Fawzi, Egypt's Defence Minister during the War of Attrition. See Fawzi, (1984), pp. 201-204. For those who thought that domestic pressure triggered the War of Attrition, see Hammad, (1988), pp. 35-38.

4. This view was emphasized by Mr Mahmoud Abaza from Al-Wafd party, in an interview, Cairo, 21 September 1988.


6. All sources agree that Egypt's economy had grown, in the period 1960-1967, at an annual average of over five percent.

7. This income covered two thirds of the deficit in the Egyptian trading balance in 1966. According to available information, in the
first quarter of 1967, Egypt's 1967 income was estimated at between 
$US 300 and 330 million. Kanovsky, (1970), p. 279. See also, Farid, 
(1979), pp.41-42.
13. Ibid., p.287.
16. These views were repeatedly expressed by Nasser in his meetings 
with Arab leaders and in cabinet meetings. See Ibid., pp.139, 157, 
161-162.
18. Ibid., p.195.
20. Nasser initially decided to send his deputy Zakaria Muhi-Edeen to 
represent him in the conferences. See Farid, (1979), p.87.
22. For detailed coverage of Egyptian political activity at this 
period, see Riad, (1985), pp.170-209.
Al-Ahram, 24 November 1967.
24. For a summary of the discussion and the decisions of the Khartoum 
Arab Summit conference of 1967, see Farid, (1979), pp.89-104.
25. In a cabinet meeting on 24 March 1968, Nasser told his Ministers
that there was a possibility that some Arab countries might cut their financial aid to Egypt under American pressure. In a meeting of the Higher Executive Committee of the Socialist Union on 12 November 1968, Dr. Labib Shukair expressed the view that the Arabs might cut their aid if Egypt did not soon start operations. Ibid., pp.119-150.


27. In an interview with Marshal Gamasy, Cairo, 17 August 1988.


29. For more details of Egyptian plans, see Fawzi, (1984), pp.230-231.


33. Immediately after the 1967 War, and within 10 days, Egypt received 25 MiG-21 and 93 MiG-17 aircraft from the Soviet Union, besides 40 MiG-17 aircraft from Algeria. See Farid, (1979), p.35; also Fawzi, (1984), pp.194-191.

34. Nasser expressed these views in a meeting with President Abdul-Rahman Aref of Iraq in Cairo on 10 February 1968. Regarding the number of Egyptian pilots in 1969, Nasser revealed in his meeting with Saudi king Faisal in August 1969 that, while Egypt had 400 aircraft, it had less than 400 pilots. Farid, (1989), pp.136,195.


38. In an interview with Marshal Abu-Ghazala, the Egyptian Defence Minister, Cairo, 6 August 1988.


40. Ibid., p.250.

41. Three batches a year of 60 graduates each would make 180, and not 200. General Abu-El-Izz explained that he was using averages but insisted that the goal was 200 pilots a year. In an interview with Abu-El-Izz, Cairo, 11 September 1988.


43. In a briefing to the visiting presidents of Algeria and Iraq on 18 July 1967, Marshal Grechko, Soviet Defence Minister, told them that Egypt had 300 aircraft but that there was a 35 percent shortage of pilots. Also, according to the annual 50 pilots graduating from the Air College, the expected number of graduates in two batches would be about 100. See Farid, (1979), pp.66-67; also Fawzi, (1984), p.250.

44. In an official visit to Bilbase Air College on 18 September 1988, I was fully briefed about the history of pilot training in the College to date by General Ahmad Maher Shihata, the deputy Commandant. This was followed by a tour of the College accompanied by Colonel Ali Zakaria, a senior flying instructor.

45. The Al-Gomhuria is an Egyptian-manufactured one-piston training
aircraft, which has been in service since the early fifties. With modifications, it is still used as the basic trainer in the EAF today.

46. The Il-29 aircraft is a Czechoslovak-made one-jet engine training aircraft, which can be used as a light strike aircraft. It has the reputation of being a stable aircraft and is therefore suitable for training.

47. Three hundred cadets flying 70 hours each makes the total 21,000 hours over six months, and 3500 a month. According to the Egyptian experience, about one third of the cadet students would fail the first phase, 20 percent in the second phase and 10 percent during the advanced phase. (From a briefing at Bilbase Air College, 18 September 1988.) Considering 100 students would be suspended from flying at different stages of flying the 70-hour programme in the first phase, if the average of 35 flying hours is taken, 3500 flying hours would be saved in six months which is about 600 a month.

48. Two hundred cadets would start flying in the second phase each for 120 hours - a total of 24,000 hours a year. Twenty percent of the cadets (i.e., 40 cadets) would drop out after flying an average of 60 hours each, saving 2400 hours a year. The remaining 21600 hours would average 1800 hours a month.

49. In the Royal Jordanian Air Force, there are, on average, 20 flying days a month, and instructors fly two sorties a day in normal situations. According to these figures, the target of 2900 hours a month in the first phase requires 73 instructors, and the target of 1800 hours a month in the second phase requires 45 instructors. In an interview with General Shurdom, Amman, 13 October 1987.

50. The highest estimate of Egyptian pilots towards the end of 1967
was 300 pilots.

51. Flying instructors are usually required to be available at the Air Traffic Control Centre or nearby position to help cadets in case of emergencies.


53. Interview with Lt.Col. Khamis Imam, who was a student in the Air College in 1969.


56. This view was expressed by Egyptian pilots who were students at the time, but senior officers argued that the all-round skills of Egyptian pilots were just sufficient. Interviews with General Barakat, General Shihata, Colonel Zakaria and Lt.Col. Imam.

57. In an interview with Marshal Abu Ghazala, Cairo, 6 August 1988.


60. Interview with General Shihata who has been serving in the Air College since then, Bilbase, 18 September 1988.

61. In an interview with the Deputy Commandant of the Air College, General Shihata, Bilbase, 18 September 1988.

62. I was told the story of an Egyptian cadet who was on a training mission flying as no.2 to his Soviet instructor when he called the tower to report an emergency (aircraft was losing height due to power failure) and requested instructions from the senior duty pilot in the Air Traffic Control Centre. The cadet was told to take orders from the Soviet instructor, but he did not have enough time to explain it until too late and his plane crashed. Interview with Lt.Col. Khamis Imam.
63. The Egyptians complained bitterly about the refusal of the Soviet Union to provide Egypt with training aircraft. (This may indicate that the Soviets had doubts about the viability of the Egyptian pilot training programme.) See, General Abu-El-Izz, 'Memoirs' Al-Liwa, 18 November 1987.


66. These views were expressed in, for example, the interviews with Marshal Gamasy, General Imam and General Fahmi.


69. This new Egyptian air policy was outlined by Nasser in a speech on 23 July 1969. Nasser, Al-Ahram, 24 July 1969.


71. This view was confirmed by General Barakat, the EAF Commander, in an interview in Cairo on 5 September 1988.

72. Interviews with General Abu-El-Izz and General Shihata.

73. Interviews with General Barakat and General Shihata.

74. This view was expressed by the present EAF Commander in an interview on 5 September 1988.

75. Abu-El-Izz, 'Memoirs', Al-Liwa, 18 November 1987. This was admitted by the EAF Commander, General Barakat, on 5 September 1988.

76. The Egyptian Navy academy was also transferred to Libya. See Fawzi, (1984), p.342.

77. Interview with General Shihata, Bilbase, 18 September 1988.
78. For example, the intake of December 1968 graduated in October 1970. Interview with Lt. Col. Khamis Imam.

79. For example, in a series of meetings with the Senior commanders of the Egyptian Armed Forces in early January 1970, Nasser admitted that Egypt still suffered from a shortage of pilots and this would take time. See Fawzi, (1984), pp. 288-289.

80. Ibid., p. 251.


82. Interview with General Musallam, Cairo, 18 August 1988.

83. Some of these battalions were of regimental strength, as Egypt was adopting this system before 1967. This regimental organization is bigger than a battalion and smaller than a brigade. Egypt abandoned this system after the 1967 War. Brigadier Mohammad Zahir Abdul-Rahman, 'Mabadi' Al-Harb Fi Quwat Ad-Difaa Al-Jawi' Wa-Mada Tathikaha Fi Al-Jawlat Al-Arabia Al-Israelia (Principles of War in Air Defence Forces: Their Application in the Arab-Israeli Rounds'), Nasser Academy (classified thesis), course No. 6, p. 22.

84. Marshal Istavistky, the Soviet Air Defence Commander at the time, was called on by Nasser in September 1969 to study and evaluate the Egyptian Air Defence system. A new plan for modernizing the system was adopted according to his estimates of the requirements of air defence weapons. See Fawzi, (1984), p. 317.

85. Ibid., p. 312.

86. This view was expressed by Nasser in a cabinet meeting on 7 April 1968. See Farid, (1979), p. 153.

87. The Israelis were able to penetrate the depth of Egypt, raiding
Nag Hamadi 60 miles north of the Aswan Dam, on 31 October 1968.

88. These weapons were introduced in the forties and early fifties and were phased out of service in the Soviet forces in the early sixties. Isby, (1981), p. 226.

89. Ibid.

90. In an interview with Marshal Gamasy, Cairo, 17 August 1988.


92. According to the recent organization of a Soviet SAM-2 battalion, it requires 111 operators. Perhaps the Egyptian battalions required more operators at the time and/or Marshal Gamasy included the administration personnel in the battalion in his 280 figure. See Isby, (1981), p. 224. For estimates of Egyptian Air Defence strength see, for example, Robert Rapolewski, 'Egypt assesses lessons of October War', *Aviation Week and Space Technology*, 17 December 1973, p. 16.

93. For more details on the discussions in these meetings, see Fawzi, (1984), pp. 288-290.


95. This was substantiated by Heikal articles in *Al-Ahram* on 15 and 20 May 1970. Earlier, Nasser had expressed similar ideas in his speech of 1 May 1970. *Al-Ahram*, 2, 15 and 20 May 1970.

96. For example, Air Defence senior officers: General Abdul-Rahman, General Abu-Saba', General Sealawy and retired General Qaramany. Interviews, Cairo, 23 August and 1 September 1988.


99. Ibid., p. 251.
100. Ibid.


104. The Egyptian Armed Forces recruited many civilian construction companies, including the largest in Egypt (Al-Mokawileen Al-Arab - The Arab Contractors), which had experience with big construction projects abroad. For the estimate of civilian victims, see Heikal, 'Snawat Al-Ghalayan', Al-Rai', Amman, 26 September 1988.
CHAPTER FOUR

THE ISRAELI RESPONSE TO THE WAR OF ATTRITION

Air Power in the Egyptian Strategy after 1967

Egypt's military aim was to build up its military strength to the degree that it could achieve the objective of liberating the Egyptian land occupied in 1967, in order to support its political strategy. Doubting the effectiveness of diplomatic initiatives in securing Israeli withdrawal from the Sinai, the Egyptian leadership's view was that a political solution to the Arab-Israeli confrontation would become possible if Egypt reinforced its strength to achieve a balance of power with Israel. (1) Towards the end of 1968, however, the Egyptian leadership decided in favour of the military option. Unable to start a general war, Egypt looked for limited military objectives to erode Israel's strength, and cause it heavy losses, thereby exerting pressure on Israel to withdraw from the occupied territories.

In searching for a suitable military option to achieve their limited military objectives, the Egyptian leadership judged that the basic precondition for any military option was to deprive Israel of its military advantages. The Egyptians considered that these advantages lay in air power and the ability to wage a war of movement. (2) What was needed was a strategy which would fit Egypt's military capabilities and in which, moreover, it would enjoy superiority. The Egyptian leadership judged that a prolonged, limited
and static war of attrition was the best military option available. This type of war was perceived as contrary to Israel's security doctrine mainly because of its limited human resources, whereas the Egyptian advantage in manpower was thought to be an important element in winning such a war. (3)

By the end of 1968, the Egyptian evaluation of the Israeli military strategy in any future war with Egypt was that it would be basically a defensive one. According to this view, Israel would no longer take the initiative because to start an offensive would mean invading Egypt. (4) The possibility of an invasion was ruled out for three reasons: a) Egypt had recovered its military strength, as was shown in the artillery exchanges of September 1968 and in the air battle on 23 October 1968, when Egyptian aircraft intercepted four Israeli aircraft and claimed downing three of them. (5) b) Israel did not possess sufficient resources for an invasion, c) Israel would be deterred from this option by fear of international reactions. A more defensive posture was judged, by the Egyptians, to offer Israel a number of advantages, such as fighting from behind the Canal obstacle and the long warning time that the Sinai desert would offer. (6) Nevertheless, if the Israelis were to attempt to invade Egypt, the Egyptian leadership was convinced that they would not succeed in repeating their surprise attack of 1967 against Egyptian air bases to wipe out the Air Force in the opening stages. (7) The Egyptians thought that this fact would add to the constraints preventing Israel from contemplating such a military option.
Once the idea of an Israeli invasion had been ruled out, the initiation of an all-out air and naval war with Israel while remaining on the defensive on land was also rejected. All-out confrontation with Israel was thought to be unsuitable for Egypt at this stage because it would allow the Israelis to use their superior Air Force, at a time when the Egyptians were not yet ready. The Egyptian leadership, therefore, embarked instead on the limited, static War of Attrition.

The Egyptians believed that, as long as the war was restricted to artillery action and commando raids, Israel would limit its reaction to artillery fire on Egyptian military positions and economic and civilian targets along the Canal, as well as to surprise commando raids in the depth of Egypt against economic and civilian targets. They judged that Israel would refrain from fully engaging its Air Force for the following reasons: first, introducing it would constitute an escalation of the war which would endanger Israel's military and political situation. (8) Second, the Israelis would fear the gradual loss of aircraft as a result of the ever-growing and improved anti-aircraft system that Egypt now had. (9) Third, the increased military operations of the Palestinian Resistance, which led Israel to adopt a policy of 'active pursuit' by sending their Air Force to attack guerilla bases on other fronts, would lead to further erosion of their Air Force. (10)

In any event, the Egyptian leadership believed that the introduction of the Israeli Air Force into such a controlled confrontation would be limited to tactical use. (11) The effect of
tactical missions against well trained and dug-in troops was thought to be limited. In this the Egyptians were partly influenced by their own experience, and partly by the course of events in Vietnam, as the mighty US Air Force failed to achieve the decisive results that were expected of it. (12)

At the beginning of 1969, the Egyptians felt that they were in a position to initiate military action; their Air Force had recovered its pre-1967 strength, air defences were improved and the major cities were defended by SA-2 missiles. The arrival of the first of the new Egyptian pilots who had been recruited in greater numbers after 1967 - following completion of their training in the Soviet Union - may have misleadingly encouraged the Egyptian leadership to start the War of Attrition at this time. (13) The eagerness of Egyptian pilots to challenge the Israelis, and the results of the air battle of 23 October 1968, convinced the Egyptians that their Air Force was now ready for a limited, carefully planned confrontation in which it could at least neutralize the Israeli Air Force. Thus, the role of the Egyptian Air Force at this stage was thought of as limited to the defence of Egyptian skies including the Canal zone; this meant preventing the IAF from penetrating Egyptian air space, with an added heavy emphasis on air defence means to defend major cities and the Aswan Dam.
Air Operations before the War of Attrition.

Although the War of Attrition is generally considered to have started in March 1969, air operations in fact began a few weeks after the June 1967 War. On 4 July, the Israelis claimed to have shot down an Egyptian aircraft from among several which had attempted to overfly Sinai. On 8 July, they claimed to have shot down another aircraft over Sinai. (14) Then, on 14 and 15 July, aircraft of both sides appeared in the air to support their ground forces, which were battling on the east bank of the Suez Canal near Port Fuad (Ras Al-Ush); the Israelis claimed that six Egyptian and one of their own aircraft were downed. (15) Regardless of the results, the fact that the Egyptian Air Force was able to appear in the sky at all and conduct strikes during this battle was as much of a surprise to the Egyptians as to the Israelis. (16)

Despite the repeated Egyptian declaration of their intent to launch a liberation battle (17), the July air clashes were the last for over a year. During this period, the IAF flew occasional reconnaissance missions over the Canal area, but with no reaction from the EAF. Having risked those few encounters up to 15 July, the Egyptians subsequently kept their Air Force away from the front. The main reason was to gain time to reorganize and train pilots and crews, which fitted into the general Egyptian plan of preparing for a future round of combat. Behind this approach was the belief, expressed by Nasser on many occasions, that time worked in Egypt's favour. In a meeting with his Army officers on 10 March 1968, he told them that Egypt had
restored its defensive capabilities, but still needed time, equipment and more weapons. (18) Later, Nasser told the national conference of the Arab Socialist Union (ASU), on 23 July 1968, that the Egyptian Armed Forces should take time in order to stand a better chance of achieving Egypt's aims. (19) This idea of gaining time was encouraged by the Soviet advisers, who considered that the EAF would not be ready to challenge the IAF for another two or three years. (20)

In the second half of 1968, the Egyptian leadership felt relatively confident of Egypt's defensive capabilities. The EAF appeared over Cairo in a fly-past on the first anniversary of the 1967 defeat, a display intended to reassure the Egyptian public that the Air Force which Egypt had lost the year before had since been reconstructed. (21) 'Now we are building up an offensive military strength', Nasser said, on 23 July 1968. (22)

On 8 September 1968, Egypt announced its new strategy of active defence after which the EAF started to fly occasional sorties, mainly for reconnaissance purposes, which also brought about occasional clashes with the IAF. (23) On 23 October 1968, Egypt announced that its Air Force had engaged an Israeli formation of four aircraft attempting to penetrate Egyptian air space in a battle over Ismailia city. Egypt claimed three Israeli aircraft shot down. (24) The Egyptian pilots who had taken part in the battle held a press conference the next day to describe the details of their battle and provide pictures of their kills which were shown on the front pages of most Egyptian newspapers. (25) Israeli silence about the incident and the lack of
additional evidence did little to dampen the intended effect on Egyptian morale and confidence.

On 31 October 1968, the Israelis carried out their first deep penetration raid on Nag Hamadi in the Nile Valley (60 miles north of Aswan). This raid triggered the concern of the Egyptian command, which was forced to postpone the start of the new Egyptian strategy (war of attrition), reinforce air defences in the area, and create the People's Defence Forces. Commenting on the raid the following day, an Egyptian military communique stated that, 'Israel has opened a new dimension in the confrontation, and if Israel can use it, others can use it too'. Two days later, Al-Ahram's main headline was; 'The formation of the People's Defence Forces has started immediately'. On 4 November, the Egyptians announced that a five-minute air battle had taken place between Egyptian and Israeli formations, and claimed one Israeli aircraft shot down over the Canal.

Faced with the prospect of more Israeli deep raids and realizing the weakness of their air defences, the Egyptian leadership debated whether to restrain Egyptian military action in the Canal zone. This was the subject of a series of meetings of the High Executive Committee (HEC) of the Arab Socialist Union (ASU) and Nasser's cabinet in November 1968. For example, in a meeting of the HEC on 12 November, Nasser said, 'We should never forget in this confrontation the necessity of protecting our vital targets, which amount to about one thousand targets at present'. In the same meeting, Hussein Al-Shafi, Vice-President and a member of the HEC said, 'There are some people,
who care about the regime and the Armed Forces, who consider that we should not make a move until our side is completely prepared'. (29) On 30 December, Nasser told the members of the HEC that the Egyptian people would accept sacrifices provided that the Armed Forces reacted to enemy military actions. (30) In an article discussing military options, on 24 January 1969, Heikal anticipated that even in a limited confrontation, there would be more deep penetration raids, on a larger scale. He gave two reasons: first, Egypt offered many vital targets for the enemy to hit; second, attacking these targets would reflect on the regime and undermine it, which was most important to the enemy at this stage. (31) Four days later, the Minister of War and the Commander in Chief, General Fawzi, announced to Parliament the completion of the work undertaken to ensure defence of vital targets inside Egypt. (32) Sadat revealed much later that the start of the War of Attrition was postponed from September 1968 to March 1969 following the Nag Hamadi raid, in order to review air defences in the depth of Egypt. (33) In general, aside from sniper activity, the front went quiet after 31 October and there were no serious clashes between Egypt and Israel until the beginning of March 1969.

The Israeli Response

The Israeli response to the War of Attrition varied over time in terms of three elements; war aims and military objectives, targets and means used. By observing distinct shifts in these elements, the Israeli strategy of response can be divided into four phases;
symmetrical response, tactical use of the Air Force, strategic bombing, and air defence suppression.

First Phase: Symmetrical Response (9 March to 20 July 1969)

In the absence of the preconditions needed for launching an all-out war, the Egyptian leadership sought to engage Israel from a defensive position, with the aim of inflicting heavy losses on the Israelis. (34) The Egyptians started the War of Attrition at the beginning of March 1969, by unleashing a heavy artillery barrage on the Bar-Lev line. The salvoes were to continue at intervals throughout the War of Attrition.

The Israeli aim in the first phase was to hold out while protecting and fortifying the Israeli presence along the Suez Canal. (35) The Israeli response was to direct artillery fire at Egyptian economic installations, which it was hoped would be sufficient to reimpose the cease-fire on Egypt. (36) With the increase of Egyptian commando raids on Israeli positions, the Israelis responded with commando raids, too, though less frequently. The Israeli attacks were of two kinds: deep penetration raids, and raids across the weakly defended coast of the Red Sea. (37)

At this stage, air activity was limited to a few clashes. Israel refrained from using its Air Force in order to avoid escalating the situation; besides, it would not have been the most cost-effective means at this stage. For their part, the Egyptians chose not to
challenge the Israeli aircraft because they believed that their own
Air Force was not yet ready. (38)

Unlike the ground battle, air operations during this phase were not
intensive but rather limited to probing operations. With the start of
the War of Attrition, both sides increased their air activity over the
Canal area - mainly for reconnaissance and monitoring the battlefield
- leading to inevitable air clashes after which both sides made the
usual claims and counter-claims. Although it is extremely difficult to
verify these different claims in each case, in general, Israeli claims
were more reliable than the Egyptian ones. (39)

The first major air battle took place on 8 March 1969. The Israelis
claimed that two out of four Egyptian aircraft had been shot down. (40)
The Egyptians admitted to losing only one, whose pilot was taken
prisoner, while claiming one Israeli aircraft. (41) The following weeks
were marked by the escalation of artillery and commando raids by both
sides, but in the whole of April there was only one air clash, in
which both sides claimed to have shot down one enemy aircraft. (42)

From 9 March to 29 April 1969, events were going well according to
the Egyptian plan. The war was confined to exchanges of artillery
fire, with only limited air activity. Reflecting his confidence at
this stage, Nasser promised his people that the final battle for the
liberation of the occupied territories would soon be launched. In his
opening speech to the second national conference of the ASU, on 27
March, Nasser said, 'We should not bring the battle forward earlier
than its appropriate date by a single day, but at the same time I promise you that we will not postpone the battle later than its appropriate day by even one day'. (43) Confirming the view that the plan was proceeding well, Heikal wrote in Al-Ahram, on 11 April, that with the exception of the air effort, the enemy would fight a static land battle. Further evidence that the Egyptians felt that the air balance was improving came at a cabinet meeting on 15 April, when the Minister of War, General Fawzi, summarizing Egypt's military plans for the near future stated: 'As regards the air, our pilots must utilize the suitable opportunities to challenge enemy aircraft'. (44) Heikal, nonetheless, sounded a warning: 'We should not be overwhelmed by joy, rather we should anticipate painful strikes'. (45)

Four days later, on 29 April 1969, that strike came. The Israelis launched further deep penetration raids on Nag Hamadi and Idfo, which were not intercepted by the EAF. (46) Although Nasser quickly stated that the Egyptian command was not surprised by the attempt to raid economic targets in Upper Egypt, the fact remains that Egyptian aircraft did not intervene, possibly due to the poor detection and early warning system. For local consumption, he added: 'Enemy aircraft may enter our air space, but our aircraft are capable of entering his too. If he hits our civilian targets, we will hit his.' Nasser also explained the Israeli aim of these raids as being to force the Egyptians to pull out some forces from the front, dispersing them in order to protect civilian targets. Egypt would not do this, he stated, and instead he had established the People's Defence Forces. (47)
From 21 May to 20 July 1969, air activity increased with the inevitable air clashes. On 21 May, several formations of Egyptian and Israeli aircraft met in battle. Both sides made contrary claims. The Israelis stated that two Egyptian formations had tried to cross the Canal and lost three aircraft (two in dogfights and one to a Hawk missile), while the Egyptians said that three formations of Israeli aircraft had tried to enter Egyptian air space, but were driven back with the loss of one plane. (48) Next day the Egyptians claimed that six Israeli Mirages attempting to enter their air space near Gardaka had been driven back with the loss of one aircraft. (49) There was another clash on 2 June, over the Gulf of Suez. The Israelis said that their planes had shot down four Egyptian aircraft, while the Egyptians stated that they had shot down two Israeli planes, for no losses of their own. (50)

Evaluating events at that point, in an Order of the Day commemorating the second anniversary of the June War, General Fawzi commented that, 'Our forces have achieved a high fighting capability, a capability shown through the confrontation with the enemy after June 1967, on land, at sea, and in the air'. (51) This confidence was soon belied by an incident on 17 June: two Israeli aircraft flew over Cairo to produce sonic booms. This demonstration was intended to warn Nasser and remind the Egyptians of the long reach of the Israelis. (52) One week later, Al-Ahram revealed that both Air Force Commander, General Mustafa Al-Hennawi, and the Air Defence Commander, General Hassan Kamel, had been dismissed and replaced with Generals Baghdadi and Mohammad Ali Fahmi respectively. (53) (The latter had been a strong
advocate of establishing a separate Air Defence Command, and was now
the first commander upon its completion).

The change in personnel did not, however, reflect a shift in
Egyptian thinking on air power. Over the next month, Egyptian aircraft
frequently met the Israelis. On the same day that the dismissals were
announced, for example, an air battle took place when four Israeli
aircraft tried to enter Egyptian skies south of Suez, losing one
according to Egyptian claims. Two days later, on 26 June, another
battle over the Gulf of Suez took place, during which the Egyptians
said they had brought down two Israeli aircraft. (54) Al-Ahram's
headline on the 27th was 'Fifty aircraft in the fiercest air battle
over the Gulf of Suez'. Its military correspondent stressed the
special importance of this battle: it was the biggest in terms of the
number of aircraft involved; it took place over a wide, 40km front;
and it lasted for a record fifty minutes. (55) In July, the Egyptians
said that air clashes had occurred on the 2nd, 6th and on the 7th, in
which they claimed to have shot down four Israeli aircraft, while the
Israelis said that they downed six Egyptian planes in two separate
encounters. (56)

In conclusion, by the end of this phase, the Egyptians had become
concerned by the trend of events in the air as indicated by the
dismissal of both Air Force and Air Defence Commanders. Egyptian
performance in air combat was not encouraging, nor was the continuing
ability of the Israelis to penetrate the Egyptian air defence system
and to appear over Cairo. Nevertheless, the EAF still challenged
Israeli aircraft which attempted to penetrate Egyptian air space. There had been no change in the initial aim of preventing the Israelis from dominating the skies over the battlefield.

The Second Phase: Tactical Use of Air Power (20 July to the end of December 1969)

The question of how to counter Egyptian strategy provoked intense debate within the Israeli leadership. Confronted with growing losses, the Israelis felt that they were being forced to fight the war on Egyptian terms. The Israeli General Staff now judged that the best answer to the Egyptian artillery preponderance would be the Air Force. The Israeli perception that the Egyptians were preparing for a crossing operation at this point reinforced the decision to introduce the Air Force, in order to block the Egyptian attempt. (57) The Israeli Air Force (IAF) came more fully into the war and began to attack Egyptian ground positions and provide counter-bombardment against Egyptian artillery, which inevitably led to a fight for air superiority over the Canal Zone. Realizing, however, that the Egyptian Air Force (EAF) was becoming bolder, albeit no more successful, the Israelis shifted their priorities, in September 1969, to include attacking the Egyptian air defence system. Israeli commando raids increased in this phase, often targeting Egyptian Air Defence installations. (58)

On 20 July the Israeli Air Force was instructed to launch an all-out attack along the Suez Canal, with its targets being Egyptian
artillery, missile sites, radar installations and AA artillery. (59) This was the beginning of a sustained offensive, but it was the massive bombardment of that first day that left the strongest impact on Egyptian views concerning air power and tactics. The Egyptians refrained from involving their Air Force that afternoon against the Israeli aircraft making hundreds of sorties against positions along the Canal. Evidently, the Egyptians had been taken by surprise by the scale of the Israeli onslaught and had therefore decided not to risk their Air Force, with the exception of a few sorties made at the end of the day. (60)

The extent of the blow, and the significance of the absence of the Egyptian Air Force, led Nasser to devote much of his speech on the 17th anniversary of the Egyptian Revolution (23 July 1969) to reassuring his public. Explaining the decision not to use the Air Force, he recalled 'We cannot ignore, of course, that after 1967, we were psychologically affected at public level, and at that of the Armed Forces and the Air Force, too. To a certain degree we were affected by propaganda (that caused demoralization). Nonetheless, our Air Force, our pilots, our sons executed all orders given to them. Our aircraft entered Sinai in formations - consisting at times of 31 planes - in the north, centre and south... In fact, we discovered the existence of some gaps which the enemy could exploit. Our Armed Forces were able to cover these problematic areas, leaving no weak points... On 20 July, Sunday, it was clear to us that the strong air defences available at the front could stand up to the Israeli air attacks and inflict heavy losses on them. One of the decisions taken was not to
commit the Air Force into the battle from the beginning, but to allow the air defence to deal with enemy aircraft. If our aircraft joined the battle, this would force us to stop our guns and missiles... After that our Air Force joined the battle at six o'clock... I have spoken with the Air Force Commanders; maybe my reservation about them is that there is still too much enthusiasm. We need to reduce this over-enthusiasm and work with cool heads, extremely cool, because we are facing a cunning enemy'. (61)

Nasser's speech also suggests the outlines of the new policy: the Egyptian command had decided not to employ the Air Force to challenge the attacking Israeli aircraft in the Canal zone, but rather to leave this responsibility to the air defence. The speech implied that the EAF would continue its attack missions as it was successful in performing this role. This marked a departure from the original Egyptian strategy of confrontation; instead, the Israeli Air Force was now allowed to operate in the Canal zone without interference from the Egyptian Air Force.

It took a week for the change in Egyptian air policy to become apparent, during which the Air Force repeatedly launched itself against the Israelis. After the initial Israeli attack on 20 July, a second big clash occurred on 24 July - the two sides made conflicting claims regarding its results. On 26 July, there was yet another air battle and again the usual claims and counter-claims were made. (62) The new policy now came into practice, as the Egyptian Air Force started to penetrate in force into Sinai to attack Israeli positions.
The first such raid was on 24 July and the second on the 27th. (63) This week of activity did, however, increase Egyptian fears of their inability to meet the Israelis in the air. The Egyptian Air Force, therefore, disengaged to review new tactics, and despite continuous Israeli attacks, the Air Force was kept away for several weeks until 11 September 1969, when a big air battle took place.

Nasser expressed Egypt's deep concern and sense of vulnerability in the air on different occasions. In a cabinet meeting on 10 August 1969, he explained Egypt's reactions to the changing military situation. 'We have to stick to our plan in reconstructing our Armed Forces and raising their fighting capabilities', he said 'provided that, during this preparation we avoid escalating military operations against the enemy unless there is careful calculation of the outcomes and the probabilities of each escalatory step. We have to take into consideration that American Phantom aircraft will reach Israel during the next month - September - but in the same month new air defence missiles will arrive from the Soviet Union, specifically those missiles which deal with low-flying aircraft that inflict heavy damage on our troops and positions'. (64) Later, at a meeting with President Atassi of Syria, on 30 August (which ended in the signing of a political agreement between the two countries) Nasser commented, 'The political command should assign one military commander to be responsible for military planning for the battle, with the priority given to Air Forces and Air Defences in the planning and operations.' He added, 'We have to exert pressure on the Soviets to provide more assistance and to involve more Soviet Air Defence experts'. (65) This
clearly indicated that the Egyptian Command was avoiding the escalation of military operations with Israel - particularly in the air - for fear of an all-out war, which they felt they were not ready for.

A new incident forced an Egyptian reaction. On 9 September 1969, an Israeli combined force landed at El-Kafayer on the Red Sea coast and moved southwards, destroying Egyptian targets. The Egyptian response was to hit back at Israeli positions in Sinai. (66) Two days later, a large Egyptian force of aircraft (the Egyptians said 102, western sources 40) attacked Israeli positions and fought Israeli aircraft. They claimed to have shot down six Israeli aircraft for the loss of two of their own, while the Israelis claimed to have brought down eleven Egyptian aircraft and admitted losing one. (67)

Although Israeli pilots proved superior in air combat, the Israelis realized that the Egyptian Air Force was becoming bolder and more experienced. Seeking to destroy the EAF's support, they started to attack radar installations and air defence sites between September and December 1969. (68)

Militarily, the Egyptians reacted to the new Israeli counterattrition by increasing their commando raids and occasional strike missions inside Sinai, in addition to the usual artillery barrages. The EAF conducted strikes on nine occasions after the 11th September encounter (on 14 September, and on 6, 24, 25 and 30 October, and 10, 11, 24, 27 November 1969). The news of these strikes was greatly...
highlighted on the front pages of daily newspapers. This method rarely involved dogfights - in seven out of nine occasions Egyptian aircraft were not intercepted, while in the other two brief air battles took place. The absence of Israeli air opposition, possibly due to the difficulty in detecting low-level attacking aircraft, encouraged the Egyptians to carry on with more ground attack missions. Conversely, the Israelis met no airborne opposition during their daily attacks along the Canal and the Red Sea coast. The Egyptians did try to intercept Israeli aircraft on two occasions: on 15 October, when they engaged attacking Israeli aircraft in the northern sector of the Canal and shot down one, and again, on 9 December, when they claimed another (the Israelis said that they had shot down one Egyptian aircraft). (69)

The Egyptian perception of the Israeli aim in expanding their area of operations and intensifying their attacks was that Israel was trying to force the Egyptians to stretch their forces away from the Suez Canal, and to force the EAF into the battle so that they could gradually destroy it. Having failed to do that, the Egyptians thought, the Israelis had shifted their effort to destroying the air defence system, including the early warning radars. (70)

Nasser remained confident in the ability of his air defences. During a meeting with King Hussein in Cairo, on 31 August 1969, he stated (with great exaggeration) that Egypt had thirty times as many anti-aircraft systems as it had had before the 1967 War. (71) Conversely, Nasser was sceptical about the EAF. At a meeting of representatives of the Arab confrontation states, he noted that
although the number of aircraft available to the four countries (Egypt, Syria, Jordan and Iraq) was greater than that available to Israel, certain difficulties undermined their ability to meet the challenge. (72)

Having doubted the efficacy of Arab Air Forces, the Egyptians suggested that the Israeli use of tactical air power would not be the decisive factor. Reflecting this view, Heikal wrote on 3 October, 'Israel is behaving as if it believed that the coming war would be an air war in the first instance. The air war cannot be decisive. Regardless of the intensity of air operations, the results remain limited. The evidence is there in Vietnam'. He believed, however, that the Israeli aim at this stage was to open a gap in the Egyptian air defence in the Zafarana area, in order to utilize it to raid the Upper Nile valley. (73) Further explaining Egyptian military policy, Nasser told Parliament, on 6 November, that Egypt was responding to Israeli escalation with air strikes and commando raids. The latter method in particular was meant to force the enemy, too, to stretch his forces inside Sinai. (74) The use of means other than the Air Force to counter Israel's tactics was due to Egyptian perception of continued weakness in certain areas. Meeting King Faisal of Saudi Arabia, on 19 December, Nasser stated that he could not decide on the date of launching a war against Israel because he needed time for military preparations. He specified: 'For example, preparing fighter pilots - we have now in Egypt 400 aircraft, but we do not have 400 fighter pilots, whereas Israel does not face this problem. (75) On the same day, Heikal wrote that, 'Israeli technological superiority over the Arabs so far is a
fact that it is neither right nor useful to ignore'. (76) The decision not to involve the Air Force was, however, most obvious from that force's absence during the longest Israeli air operation to date (on 25 December) which lasted about eight hours. (77)

The initial Egyptian response to Israeli air power was a network of SA-2 missiles. They were formed into 25 batteries, each of six launchers, and were deployed around Cairo, Alexandria, certain major airfields such as Cairo West and Inshas, the Aswan Dam and in the Canal zone. The SAM-2 was a two-stage missile, with a slant range of 28 miles and a ceiling of about 60,000 feet. The target was tracked by radar, and the missile had a radio command guidance system. The SAM-2 was mobile on its launcher, but could not be fired on the move. It was not effective at less than three kilometres altitude and it accelerated to full speed only at 25,000 feet. The SAM-2 had two 'dead zones' in which the missile could not be guided; one above the launcher, that is, above the missile's performance envelope, and the other, below the performance envelope. The SAM-2 had not proved effective against Israeli aircraft in the June War, during which Egypt had about 150 SAM-2 missiles deployed on about 18 sites, one of which was captured intact by the Israelis in the Sinai, who accordingly became familiar with the system. Knowledge of the characteristics of the SAM-2, along with the supply of American ECM pods and the improved tactics of the highly trained Israeli Air Force such as the very low attacking approach and the multi-directional attack, made it possible for the IAF to destroy the Egyptian air defence system in the Canal zone at minimal cost.
By the end of this phase, the Egyptians had lost their air defence system along the Canal, including all SA-2 missile launching sites in the area. A large number of radar sites and anti-aircraft guns were also destroyed. (78) In attempting to prevent Israeli bombing or to reply in kind by bombing Israeli positions, the EAF lost, according to Israeli sources, 38 aircraft between 20 July and the end of December 1969. (79) The Egyptians, however, admitted the loss of only 23 aircraft, while insisting that the Israelis lost 14 aircraft in these encounters which took place during the whole of 1969. (80) They also revealed that in the same year, the EAF had carried out 2900 sorties, including 1700 ground attack, 1130 air cover and 70 reconnaissance sorties - a relatively low level of activity.

To reassess and evaluate the military situation, a series of meetings, attended by Nasser, was conducted at the General Headquarters between 6 and 10 January 1970. The discussions revealed that the Egyptian Armed Forces had achieved the goals of their three-year reconstruction plan, except with regard to the number of pilots, long-range heavy bombers, and air defence weapons - especially low and medium level SAMs. (Fawzi was referring to the new need for air defence weapons which arose during the War of Attrition, and not to the original quantities envisaged in the reconstruction plan.) At one meeting, Fawzi asserts, Nasser said, 'The enemy has achieved his objectives of putting the SAM battalions out of action, and the rate of losses in air attacks has been high because our Air Force was not active during the past month - December. Our Air Force must participate in providing ground support'. (81)
The Egyptian decision to avoid throwing the Air Force fully into the battle to combat Israeli aircraft was based on several factors. First, the Egyptian success in launching surprise ground attack missions (such as those in October and November 1969) may have encouraged them to use the Air Force in this kind of operation because it did not involve challenging the IAF directly. Moreover, Egyptian counter-strikes were politically important regardless of their military value; they demonstrated Egyptian ability to hit back and were needed for public morale. At the same time, experience showed that Israeli pilots were still superior in air combat, and so to send their own aircraft to intercept Israeli attackers would only result in more casualties among Egyptian pilots and planes. Second, the Egyptians may have decided to preserve their Air Force in order to give it time to prepare for a later stage when it would be most needed, that is, during a crossing operation over the Suez Canal. Third, the Egyptians believed that the intensive Israeli attacks along the Canal and across the Gulf of Suez were not a real threat to the strategic military situation, so long as Israel used only its Air Force and did not contemplate a crossing operation. Fourth, the Egyptians thought that their commando raids on isolated Israeli positions would produce the same effect as Air Force attacks. By increasing commando raids, moreover, they would avoid risking the Air Force while it was not yet ready.

By the end of this phase, the Egyptians had realized that neither the Air Force nor their air defences were the adequate answer to IAF
superiority. They were confused and lacked credible military options, but insisted on holding out as long as possible.

The Third Phase: Strategic Bombing (7 January to 13 April 1970)

Realizing that their Air Force had not succeeded in putting an end to the War of Attrition so far, in January 1970, the Israelis decided to widen and intensify the IAF bombing by bringing the battle closer to the Egyptian people. (82) The Israeli aim in this stage was to increase the pressure on Nasser to end the war, by escalating their military action. To this end, the Israelis commenced a series of air raids deep inside Egypt. A sustained round of deep penetration raids started on 7 January 1970 and lasted until 13 April 1970. Their targets were military installations (camps, stores, missile sites, radars) and civilian targets (industrial complexes). Eight raids were against targets in the proximity (10-40km) of the capital, Cairo, as this would maximize the psychological effect and also inflict heavy losses on those parts of the Egyptian economic infrastructure that supported the war effort. At the beginning of 1970, the Egyptians were bereft of any effective air space defence along the front, apart from their aircraft which they were reluctant to commit. The appearance of Soviet pilots in Egypt, as a counter to this strategy, did, however, cause the Israelis to stop their deep attacks. (83)

Following the first Israeli deep raid on Inshas and Tel Al-Kabir on 7 January, the Egyptians retaliated by striking inside Sinai three days later. (84) On the same day, Cairo practised air raid drills, and
all civil aviation authorities were informed that new air routes had been assigned for commercial aircraft when flying over Egypt. (85) Soon after, at an open meeting with Asuoot local political commands, Vice President Anwar Sadat said, 'We are passing now through an extremely sensitive and dangerous stage. The enemy plan concentrates on conducting air raids on our rear lines, aimed at affecting our defensive lines and arousing fear inside the home front, in the hope of creating a sense of frustration and forcing us to surrender to the enemy's terms'. (86)

Pursuing the note of alarm sounded by Sadat on 18 January, Heikal wrote in Al-Ahram on the 23rd: 'What we are seeing now is a preparatory step to a final blow which would be executed by modern means of war that are the most advanced scientifically. Unfortunately - and honestly and truly I cannot hide the fact - we are facing these modern sophisticated means with what can only be described as inadequate means of our own'. In the same article Heikal also admitted a hitherto unrevealed fact, namely that the Israelis had captured an Egyptian P-12 radar during a raid on Ras Garib about four weeks earlier. He criticized the Egyptian media for hiding such information from the people and described the Egyptian military communiques as having no precise purpose. Indeed, official statements often used expressions that suggested that the Israelis had been unable to attain their objectives when in fact they had, and that made no mention of losses, or even referred to aerial encounters that had not taken place. (87)
Confronted with this crisis, the Egyptians turned to the USSR for more assistance. Earlier, on 9 December 1969, a delegation headed by Sadat had already been to Moscow to try and secure Soviet help. Its aim was to obtain additional deliveries of modern weapons, mainly the MiG-21J and SAM-3, in order to stand up to the Israeli Phantoms' penetration. The delegation came back to Cairo with promises that new deliveries were scheduled to arrive in Egypt in October 1970. (88)

Following the start of the Israeli bombing campaign, Nasser was no longer content with these arrangements and decided to visit Moscow secretly on 22 January 1970. His immediate aim was to put an end to the in-depth raids by setting up a more sophisticated air defence system. (89)

Nasser's decision to rebuild Egypt's air defence in the Canal zone after its destruction by the end of 1969 was based on the following considerations: first, the air defence would provide Nasser, who was under time pressure, with a quick solution to the Israeli in-depth raids. Second, because of the relatively lower sophistication of air defence weapons, compared with air force weapons, preparing crews for new air defence weapons was considered to be a faster and easier task for the Egyptians, besides the fact that the surviving crews of the destroyed SAM-2s in the Canal zone were already available and ready to be converted to other air defence weapons. Third, the air defence solution was thought to be more acceptable to the Soviets, since they had earlier agreed to provide Egypt with more effective SAMs - presumably the SAM-3.
At the time, Nasser put on a brave front saying, 'If Israel's aim, by these deep raids inside Egypt, was to scare the Egyptian people, in fact, it has only increased the people's determination to resist'. (90) In reality, however, as he later admitted, 'For us in the leadership the matter was very hard and very dangerous, as the people were exposed to the Israeli escalation of operations'. (91)

In order to reassure the Egyptian people, who were disturbed by the ability of the IAF to strike at targets in the suburbs of Cairo without real opposition, the Egyptian leadership stepped up the activity of the Air Force. In February 1970, the EAF, which had been inactive for some time, started to strike at Israeli positions in Sinai. Egyptian aircraft attacked Israeli positions on 13 days of that month without being intercepted (with the exception of 26 February, when an air battle took place). The Egyptians claimed two Israeli aircraft downed for the loss of one of their own. (92)

Nasser meanwhile gave some details of his agreement with the Soviets. In an interview with the New York Times, he stated that Egypt had asked for MiG-23s. When asked whether he would accept Soviet pilots in Egypt, Nasser was non-committal, replying, 'It is a critical issue and I have to think the matter over'. In the same interview, however, he revealed that he had requested the help of Soviet experts in air defence systems. He also told the newspaper that Egypt was still trying to remedy the problem of its shortage of pilots. (93)
During March 1970, the EAF launched strike missions on only two occasions, but instances of intercepting Israeli aircraft increased. Thus, there were air battles on the 6th, 16th, 18th, 25th and 29th of March, during which the Egyptians said they had destroyed three Israeli aircraft and damaged another two. (94) For their part, the Israelis said that 13 Egyptian aircraft were downed by the IAF between 26 February and the end of March 1970. (95) Increased activity and raised morale reflected the expected arrival of Soviet assistance. A further indication of renewed confidence was General Fawzi's announcement, on 5 March 1970, that certain steps had been taken to improve the effectiveness of the Egyptian air space defence. (96) Al-Ahram also appeared on 20 March with a main headline reading, 'The Soviet Union has provided Egypt with a new air defence system of SA-3 missiles'.

The Israeli in-depth raids came to a halt in mid-April, after the Israeli realization that Soviet pilots were taking the actual responsibility of defending the depth of Egypt. Fearing serious escalation and the attendant political implications, they decided to limit their operations to the Canal zone. (97)

In summary, the Egyptians had started the third phase, in January 1970, in a helpless military situation, lacking military alternatives. There was no obvious answer to the Israeli in-depth strikes. The confusion of the Egyptian leadership was reflected in the news coverage of these raids, which was minimal, and in the vague and misleading military communiques. The Soviet decision in January to
intervene in Egypt's favour was, however, a boost to the confidence of the EAF, and resulted in the sudden increase of its activity in February and March.

The Fourth Phase: Air Defence Suppression (13 April to 7 August 1970)

The Israeli aim in this phase was to prevent the Egyptians from reconstructing and reinforcing their air defence network along the Suez Canal. (98) With the introduction of SA-3 missiles, in March 1970, the Israelis feared that the Egyptians, with Soviet help, would succeed in constructing a SAM box west of the Canal which would restrict the freedom of their Air Force. They focused their effort in this stage, therefore, on destroying the SAM system.

Egyptian confidence was growing, however. In a public speech on 1 May 1970, Nasser admitted that, 'Egypt has passed through a very critical time... the enemy was able to take the initiative in the air'. But he added, 'Our Armed Forces recently regained the initiative through daring ground and air operations'. (99) Further evidence of growing confidence came three weeks later. When interviewed by Danish Television on 22 May, Nasser said, 'I could say that we are stronger than we were two or six months ago'. Nasser denied that he had requested the Soviets to provide him with the MiG-23 aircraft as he had earlier claimed. (100) This suggests either that the Soviets had refused the order or that he felt stronger.
At this point, the new emphasis was on the need to develop both an air strike capability and the air defence system. Referring to the latter capability, Nasser told the students of the Sudanese military academy on 29 May that Egypt had acquired new weapons from the Soviet Union which prevented the Israeli penetrations to the Delta and the Upper Nile Valley. (101)

Egyptian confidence did not extend to confronting the IAF in the air, however. On 31 May, General Fawzi told a special committee in the Egyptian Parliament that the IAF was superior to the EAF in the Canal zone because of its better machines. He added that, regardless of this superiority, the results of its attacks were limited compared to its effort. (102) This coincided with Heikal's accurate analysis of Israeli aims in this new phase. He wrote: 'The enemy concentrates his attacks on a strip 20 to 25km deep which runs parallel to the length of the Canal. The enemy is now trying to pound this strip with maximum firepower, believing that it is there that the new phase of the armed struggle between us will be decided'. (103)

After a brief lull, the EAF became active again in the second half of April 1970. It carried out strike missions on six occasions, some of which reached 100 km. inside Sinai. Only on one of these strikes, on 28 April, were Egyptian attacking aircraft intercepted, and a brief air clash took place before they disengaged. During May, these strike missions were reduced to four occasions (on the 13th, 14th, 15th and 30th). Similarly, EAF activity in June followed the same pattern, with surprise attacks being conducted only on the 16th, 18th, 20th, 25th
and the 26th. An isolated air battle took place on 2 June, in which the Egyptians said that they had shot down two Israeli aircraft and lost one. During July, the EAF's activity decreased even further. There was only one strike mission (on the 27th), which was followed by a brief air battle. Two other clashes occurred on the 25th and 30th, the Egyptians claiming they had shot down one aircraft in each incident. (104) The EAF kept out of combat after the clash of 30 July, until the ceasefire on 7 August 1970.

On 10 July, Heikal described the Egyptian attempts to construct an effective air defence system. Following the failure of two earlier tactics, Egypt had tried a third in May. In Heikal's view, 'air defence on this front will be the critical point which will decide who will win'. (105) Two weeks earlier, however, speaking in Benghazi on 25 June 1970, Nasser had hinted at the Egyptian determination to construct an effective air defence system in the Canal zone: 'Very soon we shall be able to establish complete air defence in the Canal zone. We shall very soon be able to make up for the Israeli air superiority by achieving a balance in the air'. (106) Later, in a speech on 23 July, Nasser explained, 'The war we are facing now is the first of its kind in history; the war centres essentially around air superiority and air war, not to mention the use of electronic equipment which is not available anywhere else except in the USA in the west and the Soviet Union in the east'. (107)

During the fourth phase, in conclusion, the Egyptian leadership sounded more confident for they were relieved by the cessation of the
Israeli in-depth raids. Their confidence was demonstrated in their statements and in the change of the pattern of their communiques. After May 1970, the latter mentioned the number of Israeli attacking aircraft and the duration of these strikes. (108) However, despite regaining confidence, the Egyptian command was deeply concerned about the air defence battle against the IAF in the Canal zone. The Egyptian leadership was convinced that the only way to achieve a strategic balance was by depriving Israel of its own strategic advantages. The neutralization of the IAF was dependent on success in constructing an air defence complex west of the Canal, which Egypt eventually managed to do with the help of the Soviets.

Finally, the Egyptian evaluation that their Air Force was no match for the IAF was strengthened in this phase. Despite the presence of Soviet pilots to defend the depth of Egypt, the freeing of Egyptian pilots from this task did not bring about an increase in the frequency of Egyptian air operations at the front. On the contrary, Egyptian air activity during the fourth phase dropped to its minimum during the War of Attrition. Whether it was Nasser who changed his mind about the request for MiG-23 aircraft, or the Soviets who turned him down, the fact remains that he could do nothing to improve the EAF ability to challenge the Israelis, and he had to come to terms with the fact. This he did by focusing on the air defence, and by diverting the focus of Air Force activity to conducting surprise ground attacks.
The Israeli Response: Implications for Egyptian Military Thinking.

In starting the War of Attrition, the Egyptians realized the potential of the Israeli Air Force and its prominent role in Israeli military and strategic thinking. The Egyptian evaluation that, as long as the War of Attrition was kept within certain bounds, Israel would not be able to demonstrate its strategic superiority was proved to be faulty. However, the experience of the War of Attrition led to a real change in Egyptian military thinking, and to several fundamental lessons.

In the Air.

During the 1967-1970 period, the EAF passed through two main phases: survival and probing, and self-assertion. The first phase started immediately after June 1967 and continued until the start of the War of Attrition in March 1969, while the second phase extended from then until the cease-fire on 7 August 1970. The start of the War of Attrition compelled the EAF to move to the more progressive phase, against Soviet advice. With the permission of the Egyptian command, the EAF increased its activity over the Canal zone, and confronted the Israelis more frequently. The results of air engagements in May, June and July 1969 favoured the Israelis, which forced the EAF to back away for reassessment. Upon the Israeli decision to launch the limited air offensive, in October 1969, against all Egyptian air defence systems, the EAF was reactivated to conduct a limited number of strike missions in Sinai and to intercept Israeli aircraft on occasions. The results
of air battles in this period were again in Israel's favour. The
Israelis claimed to have shot down 61 Egyptian planes between June
1967 and the end of 1969. (109) Later, following the Israeli in-depth
strikes in January 1970, the EAF was once again compelled to appear on
many occasions and attack Israeli positions on the east bank of the
Suez Canal while avoiding the Israelis in the air as much as possible,
a policy which continued until the end of the War of Attrition.

Besides the original problem of the shortage of pilots, the EAF
faced another problem: not only did it need time to train new pilots
and retrain the existing ones, but the premature start of the War of
Attrition now led to more Egyptian losses. With the continuation of
air engagements, the Egyptian military command realized that the
Soviet advice to preserve the Air Force, giving it time to train, had
been wise. However, the Egyptians drew two conclusions from the
experience: first, it was impossible to dispute Israeli air supremacy
by air action; second, the best use of the EAF at present was to
conduct shallow interdiction missions.

Air Combat.

Senior Egyptian military commanders agreed that Israeli air tactics
were far better than their own. General Shazly, the Chief of Staff of
the Egyptian Armed Forces (1971-1973), believed that as the Israelis
were holding the initiative, they were able to plan both place and
time when setting up air battles. Accordingly, they prepared the best
pilots to conduct deliberate air engagements with whichever average
Egyptian pilots were on operational duty at the time, resulting in yet more Egyptian losses. (110) Both General Shazly and General Fawzi, the Commander-in-Chief (1967-1971), pointed out that the Egyptians had a weakness in their radar control system. (111) Although this was essential in air-to-air combat for vectoring each interceptor aircraft and manoeuvring it in order to place it in an advantageous position for launching its weapons, Egyptian radar intercept controllers were not given sufficient attention in terms of their selection and training. (112) Egyptian controllers were trained in the Air College with no flying experience. Later, however, in order to remedy this disadvantage but not lose active pilots, the Egyptians trained those pilots who had become unfit for flying to be interceptor controllers. (113)

In addition to Egyptian complaints of the poor performance of their Soviet aircraft compared to American aircraft, the new generation of Egyptian pilots, who started their training after the 1967 War, did not have sufficient time to accumulate reasonable flying experience. According to General Shazly, the average flying experience of Egyptian pilots during the War of Attrition was less than 1000 hours, while it was about 2000 hours for Israeli pilots. (114)

Strike Missions.

Although the Egyptians realized that their aircraft could not reach the IAF bases and targets inside Israel - mainly because of the short range of the MiGs - and despite the Egyptian conviction that air power
was not effective in tactical strikes against highly trained and dug-in troops, the Egyptians adopted these surprise strikes against forward and rear echelons of Israeli ground forces. There were two reasons for this paradoxical behaviour. Firstly, the realization that to keep challenging the IAF in the air would only lead to more losses left the EAF with no specific role. The limited success that the EAF achieved in attacking dispersed targets inside Sinai without being intercepted encouraged the Egyptians to develop these tactics. Secondly, failing to meet the Israelis in the air, the Egyptian leadership was under pressure to convince the public, which had started to feel and see for itself the effect of the Israeli attacks after January 1970, that the EAF was doing something in return. As a result, regardless of the military effectiveness of these strikes, they were politically expedient.

Air Space Defence.

The full introduction of the IAF in July 1969 led to the destruction of the Egyptian air defence system and to the start of the in-depth raids, with the following results.

a) Introduction of New Ground-Based Air Defence Weapons.

The easy destruction of the Egyptian air defence system disturbed not only the Egyptians, but also the Soviets. Therefore, when the IAF began its in-depth raids and Nasser turned to the Soviets for help, their response was immediate. They provided Egypt with SA-3 missiles,
which enjoyed greater mobility and effectiveness. An unprecedented move was the involvement of Soviet combat personnel in 1970, which will be further discussed in the following chapter. The SAM-3 systems were manned by Soviet troops and deployed both in the Canal zone and in-depth. Soviet air space defence units, reaching a total of about 20,000 troops, assumed responsibility for the protection of the Egyptian interior. Towards the end of the War of Attrition, the Soviets also introduced SA-6 missiles, ZSU-23-4 anti-aircraft guns and electronic warfare equipment.

b) Gradual Shift in Egyptian Air Strategy.

The introduction of the IAF and its success in destroying the Egyptian air defences towards the end of 1969, and the heavy price the Egyptians paid whenever they tried to challenge the IAF in the air, strengthened the Egyptian evaluation that an essential factor in Egyptian strategy for any future war must be the ability to attack Israeli air bases inside Israel. Without having a force of medium or long-range fighter bombers, there would be little hope of winning the war. Therefore, the Egyptians repeatedly requested the Soviet Union to supply them with this type of aircraft, but without success. The destruction of the Egyptian air defence system by the end of 1969 led the Egyptians to conclude that air defence alone would not be an adequate answer to the superior IAF. During this stage, Nasser stressed the need to reactivate the EAF to take a greater role in fighter defence. (115) Referring to the Israeli in-depth raids on 23 July 1970, Nasser said, 'During those days, we found, in fact, that
our air defences were not able to stop this serious Israeli threat'. (116)

The start of the Israeli in-depth raids in early 1970 created a situation whereby the Soviets decided to send combat units to Egypt. The Soviet presence with modern air defence weapons gave them the opportunity to demonstrate the effectiveness of fully integrated air defence elements. The sharp increase in the number of Israeli aircraft losses to the Egyptian air defence in the Canal area, in the week of 30 June to 6 July 1970, was a reward of Egyptian determination to construct the SAM box and gave a sense of victory over the IAF. As a result, a significant reverse in Egyptian thinking regarding the air defence took place in a short period of time. The Egyptians now, concluded that it was possible to neutralize the IAF through air defences, and that possession of a long-range strike force was not a necessary precondition in order to start an offensive. (117)

c) Urban Air Space Defence.

In defending Egypt against the Israeli air attacks, the Egyptian dilemma was that in order to defend every point in their huge country, an effective air force would be the most cost-effective answer. With the Air Force still not ready for this task, the Egyptian command was unwilling to commit it massively too soon. This left them with the air defence answer, which in turn caused different problems. In addition to the tremendous requirements of more air defence systems to cover the huge size of Egypt, dispersing air defence weapons over a wide
area would leave individual sectors exposed and weak. Nonetheless, dispersal would combat the Israelis everywhere, regardless of the results, which was politically necessary so as to give confidence to the people. Until the start of the Israeli penetration raids, the Egyptian General Staff had sought to concentrate available air defence resources around a few major population centres and air bases, but the Nag Hamadi raid in October 1968 and fear for the Aswan Dam triggered a shift to a policy of dispersal. This new strategy led to a further expansion in air defence forces. Despite Israeli success in destroying most of the air defence weapons by the end of 1969, the basic infrastructure of this air defence network was already established; that is, the personnel, support systems, communications centres, radars, and depots had been developed. Therefore, the massive supply of Soviet air defence weapons, following the Israeli strategic bombing at the beginning of 1970, was easily absorbed and made use of.

Conclusion

The Israeli responses to the War of Attrition had a crucial impact on Egyptian military thinking. They caused a gradual shift in the thinking towards placing primary reliance on air defence systems in order to neutralize the IAF, itself a prerequisite to launching an all-out offensive.

The question of whether the IAF strategic bombing campaign at the beginning of 1970 achieved its objectives remains controversial. One
thing is certain, however: that this campaign caused the construction of the densest air defence network known to date in the Canal zone.

Had the Israelis responded differently to the War of Attrition and avoided attacking the depth of Egypt, Egyptian air strategy might not have developed the same way it did. Similarly, if the Israeli response had not been to introduce their Air Force, then the EAF would have avoided confronting the IAF at the beginning of the War of Attrition, leaving more time for its training and preparation. Consequently, the Egyptians might have come to different conclusions about the role of the Air Force in their strategy.
References.

1. This view was expressed by Nasser in an interview published in Al-Ahram on 21 January 1968. He said, '... we must realize that the enemy will not withdraw unless we force him to withdraw through fighting. Indeed there can be no hope of any political solution unless the enemy realizes that we are capable of forcing him to withdraw through fighting.'

2. Israeli military advantages were assessed - realistically - after the 1967 War by the Egyptians, many of whom wrote about and commented on them. For example, see Shazly, (1980), pp. 23-24.

3. In one article, Heikal gave an example that if Israel succeeded in inflicting on Egypt 50,000 casualties in an attritive war, because of its manpower reserves Egypt could, nevertheless, go on fighting. However, if Egypt succeeded in inflicting 10,000 casualties, Israel would find itself compelled to stop fighting because of the limited manpower resources at its disposal. Heikal, Al-Ahram, 7 March 1969.

4. These arguments appeared in a Heikal article in Al-Ahram, 9 August 1968.

5. Nasser's speech on 14 September 1968; Al-Ahram, 15 September 1968.


10. This view was expressed by Heikal, Al-Ahram, 28 March 1969.


16. Generally, Egyptian and Israeli claims of aircraft losses or even of the occurrence of specific incidents differed widely and neither side consistently released figures. In an interview with *As-Sharq Al-Awsat* (a London-based Arabic daily newspaper) General Abu-El-Izz, the EAF Commander in 1967, gave a detailed description of the EAF intervention in the battle of Ras Al-Ush, on 14 July 1967, expressing the view that this participation surprised Egyptians at all levels; *As-Sharq Al-Awsat* (London) 4 June 1987.

17. This policy was voiced by Nasser as early as November 1967, when he announced, 'What was taken by force will be retaken by force and only by force,' *Al-Ahram*, 24 November 1967; see also Nasser's speeches of 12 March and 23 July 1968, *Al-Ahram*, 13 March and 24 July 1968.


23. This new Egyptian strategy of 'active defence' was announced in a military communique on 8 September 1968. *Al-Ahram*, 12 September 1968.

October 1968.

25. Obviously, this was aimed at building up morale in the Air Force and the public. See, for example, Al-Ahram, 25 October 1968.

26. The idea of training citizens in using light arms was mainly to defend dispersed economic targets against Israeli heli-borne troops.

27. Egyptian military communique on 1 November 1968. Al-Ahram, 2 November 1968.


29. Farid, (1979), pp.120-121.


34. These preconditions as perceived by the Egyptians were: establishing an eastern front (supposed to consist of Syria, Jordan and Iraq), achieving a relative balance of strength between Egypt and Israel, and creating favourable international conditions. These preconditions were repeated often by Nasser and Heikal. See, for example, Nasser's speech of 27 March 1969, Al-Ahram, 28 March 1969. See, also, Heikal's articles, Al-Ahram, 16 February 1968 and 7 March 1969.


36. For example, the Israelis fired frequently at Suez oil refinery, setting several storage tanks on fire.

37. An example of the deep raids was the raid on Nag Hamadi in the
Upper Nile Valley on 29 April 1969. According to General Fawzi, all Egyptian efforts were concentrated on constructing a defensive line west of the Canal, from Port Said in the north to Adabiah in the south, leaving the Red Sea coast with no defences or early warning radars. See Fawzi, (1984), p.227.


39. This conclusion is based on the Egyptian military communiques' exaggeration of the number of Israeli aircraft lost in battles, while ignoring own losses. For example, during the year 1969, the Egyptian military spokesman claimed that 62 Israeli aircraft were lost while admitting losing eight. Al-Ahram, 1969. However, the C-in-C at the time, General Fawzi presented different figures. He claims that during 1969 Egypt lost 23 aircraft while Israeli losses were 25 aircraft including five helicopters. Fawzi, (1984), p. 289.


44. Farid, (1979), p.163.


46. An Egyptian military communique, on 29 April 1969, stated that air defence forces confronted the enemy aircraft. Al-Ahram, 30 April 1969.


51. Fawzi, Al-Ahram, 6 June 1969.


57. On the different arguments among Israeli decision makers regarding the introduction of the Air Force, see Siman-Tov, (1980), pp.84-90.

58. For example, in the Ras Galeb raid (115 miles south of Suez city) on 27 December 1969, the Israelis were able to dismantle and remove a Soviet P-12 radar. For more details on these raids, see Fawzi, (1984), pp.282-285.


60. An official Egyptian spokesman stated on that day that 'the last operations are an escalation of the situation'. Egyptian military communique on 20 July 1969. Al-Ahram, 21 July 1969.


65. Ibid., pp.175-176.

66. In the Ras Zafarana raid, the Israelis used six tanks, three personnel carriers, and 150 personnel, which they ferried to El-Kafayer across the Red Sea (about 25 miles south of Suez city). After destroying a radar station, they moved southwards along the main coastal road, under Israeli Air Force cover. Arriving in Ras Zafarana, they seized four Egyptian armoured vehicles, one of which was a T-62 tank. O'Ballance, (1974), p.88. For the Egyptian version of this raid, see Fawzi, (1984), pp.282-285.


69. Egyptian military communiques published in Al-Ahram on 16 October and 10 December 1969.

70. This evaluation appeared in Heikal's articles, Al-Ahram, 26 September and 3 October 1969. Also in Nasser's speech in the Egyptian Parliament on 6 November 1969. Al-Ahram, 7 November 1969.

72. Ibid., p. 182.


80. Fawzi, (1984), p. 289. The figures provided by Fawzi are more realistic than those of the Egyptian military communiques. During the same year (1969), the Egyptians publicly admitted losing only six aircraft, while they claimed shooting down 22 and damaging three Israeli aircraft in air battles.

81. Ibid., pp. 288-289.

82. For more details on Israeli aims in this phase see, Siman-Tov, (1980), pp. 120-125.

83. According to Herzog, the presence of Soviet units in Egypt created a situation whereby an Israeli penetration of Egyptian air space could spell a clash with Soviet forces. Herzog, (1975), p. 253.


87. Expressions like, 'a few enemy aircraft attempted to penetrate our air space at low level'; 'enemy aircraft were confronted by air defence means, and were chased out by our fighters'; 'enemy aircraft penetrated at low-level in an attempt to strike at...', were usually repeated in Egyptian military communiques, especially those of January and February 1970.

88. Fawzi, (1984), p. 351. General Fawzi was a member of the Egyptian delegation.

89. Haikal, (1975), p. 84.


92. According to Egyptian military communiques, there were strikes on 3, 6, 7, 8, 11, 13, 17, 18, 19, 24, 25, 26, and 28 February 1970.

93. This interview was published in the *New York Times* and in *Al-Ahram* on the same day, 15 February 1970.


95. 'Air War over the Suez', *Born in Battle*, March 1980, p. 35.


100. *Al-Ahram*, 23 May 1970


104. Egyptian military communiques in April, May, June, July 1970.


108. This change in the form of Egyptian military communiques coincided with the appointment of Mohammad Heikal as Minister for National Guidance on 29 April 1970, which suggests that this change was his idea since he had criticized the Egyptian media earlier in January 1970.


112. Ground radar control is an integral part of the Soviet Air Defence system, given the limited airborne radar coverage of their aircraft and the need to help the fighter pilots during night operations and in bad weather conditions.


115. This was one of Nasser's directives to the Egyptian military command during the re-evaluation meetings held in the period between 7 and 10 January 1970. Fawzi, (1984), p. 288.


CHAPTER FIVE

The Soviet Role

The USSR took the responsibility for the reconstruction process of the Egyptian Armed Forces after the 1967 defeat. Soviet policy towards Egypt was, nevertheless, dictated by its interests as a superpower in the region, and was planned according to Soviet perception of how to achieve its objectives. Soviet policies conflicted with Egyptian plans to build an offensive military machine in a short period of time capable of liberating the Egyptian territories occupied in 1967, resulting in frequent friction in the relations between the two countries. The Egyptian need of the Soviets, their only source of support at that time, coupled with the influence of the other factors discussed earlier, forced the Egyptians to accept less ambitious goals and to reinforce their defensive, rather than their offensive capability. The new reality in the Egyptian force structure dictated the adoption of the concept of neutralizing the IAF by ground-based air defences, and consequently imposed the change towards a limited offensive concept.

Soviet influence was an important reason for the changes concerned. This influence was most felt in the following spheres: arms supply policy, the Soviet military intervention in 1970 and Soviet doctrines and weaponry, all of which were reflected in the changing Egyptian force structure.
Background

The Soviet Union's interest in the Middle East came to light after the Second World War and the onset of the 'Cold War', for economic, political, and military-strategic reasons. Foremost among these was the old Soviet dream of acquiring access to the warm water in the south (the Mediterranean and the Indian Ocean). (1) After the withdrawal of Soviet troops from Iran in 1946, the USSR lost the only foothold it had in the Middle East. In the early 1950s, however, events in the Middle East such as the upheavals in Egypt and Syria, and western attempts to establish regional military pacts, changed the environment and paved the way for a Soviet role. (2) In Egypt, Jamal Abdul-Nasser, the dominant personality in the Revolutionary Command Council (RCC) which came to power in 1952, refused to join any western-patronized military pacts and opposed the British and United States policy of containing Communism through alliances with countries of the Middle East and South West Asia. (3) Suspicious of western arms flows to Iraq, which Nasser perceived as Egypt's main rival in the Arab World at the time, and pressed by the need to build Egyptian military strength after the experience of the 1948 War with Israel, the Egyptian leadership turned to the Soviet Union for assistance. The latter seized the opportunity to exercise more influence in the region. In September 1955, Nasser announced a major arms agreement with Czechoslovakia following US refusal to supply the needed items, thus ending the western arms monopoly. (4) The American and British reactions of withdrawing their proposed contributions to the financing
of the Aswan Dam, announced on 18 July 1956, pushed the Egyptian leadership further towards greater reliance on the Soviet Union. (5)

Despite ups and downs in Soviet-Egyptian relations, the USSR remained the main political and military ally of Egypt in the Middle East until 1972. (6) Egypt was of primary concern to the USSR for it represented a bridgehead in pursuing Soviet strategies in the Middle East and Africa. Nasser's influence on Arab public opinion and his reputation as an 'anti-imperialist' and supporter of all freedom movements in the 'Third World' helped the USSR to penetrate into Africa, as well as into other Arab countries such as Iraq, Syria, and Yemen. Meanwhile, the USSR, over time, became the only source for Egypt's weapons. The size of the Soviet military mission in Egypt remained relatively small, however; up to 1967, there were only 400-500 advisers of different specialities with a limited role in advising Egyptian commanders and staff, primarily on the technical operation of weapons. (7)

Soviet Policies Towards Egypt post-1967

In their relations with Egypt, the Soviets were governed by certain principles stemming from their strategic posture and from tacitly agreed patterns of superpower behaviour. (8) Supplying Egypt with weapons was seen as linked to Soviet relations with the US, and to the Soviet wish to avoid provoking a superpower confrontation over the Middle East. Due to their 'deep concern for their strategic interests in the region, however, the Soviets were obliged to support Egypt
following the 1967 defeat, in order to avoid suffering a diplomatic defeat also. The Kremlin leaders were stunned by the way their Arab allies were defeated in the 1967 War. Shock gave way to disappointment and anxiety, fuelled by three main concerns. Firstly, the USSR was alarmed by the possibility of the collapse of its allies' regimes in the Arab World, which would result in the loss of its influence in the region to its rival, the USA. Secondly, the Soviets were deeply concerned about the anti-Soviet sentiment which surfaced in Egypt and in the Arab World in the wake of the June War, and about the possibility that Egyptian leaders might turn to the USA for assistance in reaching a political settlement without Soviet participation. (9) Thirdly, the USSR felt that the 1967 events were a blow to the credibility of Soviet arms and technology. (10) Having all these fears in mind, the Soviet leaders decided to compensate for Arab losses in the 1967 War, and arms shipments started to arrive in Egypt as early as 9 June 1967.

The Soviet response was swift and comprehensive. From 9 to 18 June, Soviet transport aircraft made 550 flights to Egypt while fifteen cargo ships arrived at Egyptian ports. High priority was given to replacing combat aircraft. In addition to 40 MiG-17s from Algeria, Egypt received 93 MiG-17s and 25 MiG-21s from the USSR during the ten days following the cease-fire. Altogether, some 50,000 metric tons of equipment were airlifted and shipped to Egypt in that period. (11) By the end of June, the USSR had replaced 200 MiGs; by the end of 1967, 80 percent of the aircraft that Egypt had lost in the War had been replaced. (12)
Parallel to their massive arms shipments and efforts to rebuild the Egyptian Armed Forces immediately after the 1967 defeat, the Soviets started diplomatic efforts to arrive at a peaceful settlement to the Middle East conflict. In their endeavour, they encouraged Egypt to accept the proposals for a settlement presented to the United Nations in the Summer of 1967. Nevertheless, Soviet diplomatic moves were to no avail. The Egyptians wanted to renew military operations soon, against Soviet advice, and eventually did so in September 1968. In this situation, a new Soviet military support policy took shape which was carefully balanced and limited to defensive weapon systems.

Several inter-related considerations were responsible for the cautious new Soviet policy of arms support to Egypt: Soviet interest in preserving Israel and maintaining the status-quo in the Middle East; avoiding confrontation with the US; fear of another Egyptian defeat if Egypt decided to go to war; and Soviet doubts about Egypt's ability to absorb more weapon systems.

In the first case, the Soviets did not want a drastic change in the Middle East political map. On many occasions, Soviet leaders expressed to Arab leaders and Egyptian officials their anxiety that Israel should continue to exist. The most prominent example was Podgorny's remark to Nasser during their first meeting after the War, in Cairo, in June 1967, when he posed the surprise question: 'Are you demanding more aircraft to seek the final destruction of Israel?'. Another example was a similar remark by Marshal Zakharov, Chief of Staff of Soviet Armed Forces, during his meeting with Egyptian military
commanders in June 1967. To the astonishment of the Egyptians, he replied to their request for long-range aircraft by asking, 'Why do you want long-range aircraft? Let Israel live'. (15) This fear over Israel's existence stemmed not from sincere concern for the country, but from a desire to maintain the status-quo in the Middle East, in which the Soviet Union could preserve its interests. (16) An Arab success, without the help of the Soviets, in arriving at a final settlement with Israel, whether through military or political means, would jeopardize the Soviet influence and role in the region as much as the collapse of pro-Soviet Arab regimes. (17) The Soviets feared that their relations with Arab countries, mainly Egypt, which had basically started and developed because of these countries' continuous feeling of threat from Israel and the subsequent need for Soviet weapons, would, from the Arab point of view, lose their driving force once they achieved a final settlement with Israel. This might also lead to an Arab shift of alliance from the Soviets to other western countries. (18) These fears were strengthened by Egyptian attempts to open channels of dialogue with the United States and China after the 1967 War. (19)

A second consideration behind Soviet caution was that they had carefully conducted their strategy in the Middle East to avoid confrontation with the US. Every possible reaction by the other superpower would therefore be carefully considered before taking any step. (20) This fact was best demonstrated in Soviet-Egyptian Summit meetings when on many occasions Soviet leaders used to explain the danger of Soviet-American confrontation leading to world war in some
of the options available. On 18 July 1967, in his meeting in Moscow with Presidents Boumedienne of Algeria and Aref of Iraq, Brezhnev explained that if hostilities were renewed now and Israel attacked Egypt that would lead to an inevitable confrontation with the west (including the US.). (21) Egyptian leaders grasped this fact, but they felt at times that the Soviets were less committed to the Arab cause than the Americans to Israel, and their perception was that the less aggressive Soviet policies could only be explained by a Soviet feeling of inferiority to the United States. In a meeting in Moscow on 23 July 1970, Nasser asked Brezhnev, 'Why is it the Americans can always escalate their support whereas we sometimes behave as if we were scared?'. He was interrupted by a furious Brezhnev who said: 'We are not scared of anybody. We are the strongest power on earth. But you must understand that this will involve a considerable risk, and I don't know that we are justified in taking it. We must weigh up our position'. (22) Another indication of this perception by the Egyptians was Sadat's argument about the Egyptian need for weapons. Sadat told the Soviet leaders: 'I could accept being one step behind Israel, but for that gap to be 20 steps is unbearable'. (23)

In essence, the Soviet policy of avoiding confrontation with the United States in the Middle East stemmed in fact from its interests in the area. Soviet policy aimed at achieving several goals: liquidating the Israeli aggression of 1967 through a political settlement while maintaining an Israeli threat, and strengthening Soviet presence while avoiding confrontation with the US. (24) The Soviet leadership judged that the best way of achieving its goals would be to liquidate the
Israeli territorial gains of 1967 through a peaceful settlement. This solution would enable the Soviets to maintain their presence in the area and would help in weakening the American position in the region, while at the same time avoiding a military confrontation with the US. (25) There were many indications of this Soviet approach: the frantic Soviet political efforts in the United Nations and with western countries during the period 1967-1969, their reluctance to meet all Egyptian demands for weapons and their repeated advice to the Egyptians to avoid military operations and to seek a political solution.

The third consideration was that Egypt's increasing demand for weapons to meet the requirements of its Armed Forces reconstruction plan which aimed at enabling Egypt to possess offensive capabilities fed the Soviet fear of hasty decisions by Egyptian leaders to go to war. The Soviets were concerned about the way the Egyptian leadership would employ the military strength it was insisting on having. The Soviet leadership suspected the Egyptians would use it not to demonstrate power in order to exert pressure on Israel for a political settlement, but in an attempt to destroy Israel. The latter would be against Soviet interests in case of success or failure. If the Egyptians managed to launch a strong offensive against Israel, this would lead to an American intervention, the Soviets calculated, which would make an American-Soviet confrontation inevitable. Another Egyptian military defeat might also lead to a dangerous and unpredictable situation. (26)
The fourth consideration for Soviet policy was that they were not convinced of the Egyptian ability to absorb more weapons or to handle sophisticated weapons effectively. The Soviet leadership expressed their concern about the effective use of weapons by the Egyptians on many occasions. In a meeting with Arab leaders in Moscow on 18 July 1967, Brezhnev pointed out that, before the 1967 War, Marshal Amer used to request weapons and equipment telling the Soviets that Egypt had the training schools and the required cadre. He added that the Soviets now realized their mistake in sending weapons without making sure of their effective use. (27) Increased weapons shipments to Egypt would imply sending more Soviet military experts to Egypt, whereas the Soviet leadership wished to avoid increasing the number of Soviet advisors among the Egyptian Army for fear of friction. (28) The Soviets believed that Egypt lacked trained personnel in every service. (29) Consequently, providing more weapons would only mean keeping them in storage. Furthermore, the Soviets feared that more of their new weapons systems would be captured by Israel if sent to Egypt. The Soviets' disappointment on discovering that most of their modern types of aircraft, tanks and missiles ended in American research centres after being left in Sinai in the 1967 War was strongly expressed to Arab leaders by Brezhnev. (30) These fears proved justified when more new weapons were captured by the Israelis during the War of Attrition.

Soviet Arms Supply

The above-mentioned considerations dictated Soviet arms supply policies towards Egypt. The Soviets were hesitant in providing Egypt
with the weapons required to achieve military superiority over Israel. In response to the repeated Egyptian demand for weapons, the Soviets adopted a policy of gradual introduction of defensive weapons, which was enough to pose more problems for the Israelis, but would not encourage Egyptian leaders to start another war.

From June 1967 until the death of Nasser in September 1970, five Soviet-Egyptian summit meetings took place, besides meetings at ministerial and 'senior official' level. (31) Of significant military importance were the first and the fourth meetings. The first was hosted by the Egyptians on 21-23 June 1967, during which the USSR agreed to provide Egypt with the needed weapons, including air defence weapons and forty MiG-21 aircraft. (32) More importantly, the Soviets declined Nasser's request to place Egypt's Air Defence under Soviet command; instead, they agreed to send about 1200 advisers, of whom roughly half were for the Air Defence. (33) The fourth summit meeting took place in Moscow on Nasser's secret visit on 22 January 1970. Nasser was able to persuade the Soviet leaders to supply Egypt with more arms, especially air defence weapons. (34) Most surprising was that the Soviets this time agreed to send crews to operate the SAM-3s and to fly the MiG-21s defending the Egyptian interior, a Soviet action which will be discussed later in this chapter.

In all Soviet-Egyptian summit meetings during 1967-1973, the Egyptian side always requested more sophisticated aircraft and other offensive weapons, namely MiG-23, MiG-25, and Tu-16 aircraft, and medium-range surface-to-surface (SCUD) missiles capable of reaching
Israeli cities. (35) The Soviets were reluctant to supply such items, however, and used to postpone the request till some time in the future. Despite Nasser's repeated requests, the Soviets refused to send him long-range Tu-16 aircraft, preferring instead to send him a Soviet-manned SAM-6 brigade and four Soviet-piloted MiG-25 aircraft (for tactical and strategic reconnaissance, to be operated from Cairo-West air base). (36) In this context, it is important to note that the Egyptian concept of deterrence was based on the ability to reach populated areas and IAF bases inside Israel with long-range aircraft, or surface-to-surface weapons. The Egyptian request to have a deterrent capability gained momentum after 1970, but all this relentless Egyptian effort did not succeed in changing Soviet arms supply policy, resulting in Egyptian frustration and loss of faith in the Soviets. (37)

In analysing the Soviet arms-supply policy to Egypt from 1967 to 1973, the following elements become apparent: firstly, during these six years, the Soviets did not introduce any new offensive weapons to the Egyptian forces, with the possible exception of modified MiG-21s with longer range. Even the provision of new defensive weapons was contingent on the American introduction of new offensive weapons to Israel. Following the introduction of A-4H (Skyhawks), first delivered to Israel in September 1967, the Soviets provided Egypt with more SAM-2 batteries and various types of anti-aircraft guns. The Israeli receipt of the F-4 (Phantom), first delivered to Israel in September 1969, was followed in Egypt by the introduction of SA-3 missiles in March 1970 (with Soviet crews). Later, in the summer of 1970, Israeli
raids intensified and persistent attempts were made to prevent the Egyptians from constructing the SAM box west of the Canal, during which more ECM pods were used by American aircraft against Soviet SAMs. Towards the end of the War of Attrition, in consequence, the USSR provided the Egyptians with ground-based ECM equipment and SAM-6 air defence systems (with Soviet crews). (38)

Secondly, the speed with which Egypt was supplied with arms and spares depended on Egyptian positions with regard to the USSR's regional policies. The Soviets agreed to Nasser's strategy of seeking a political settlement, at the same time strengthening his military situation. (39) The first stage of Nasser's plan to recover Egypt's military strength was the 'resistance', through artillery exchanges and small-scale raids. (40) Later, however, when Nasser progressed to the next phase of his plan by announcing the start of the War of Attrition, the Soviets opposed this escalation and arms shipments were slowed. (41) Another example was when Sadat assisted the Sudanese government against the attempted coup by the communist party in 1971; the Soviet response was to delay scheduled arms shipments and decline new Egyptian requests for arms. (42) This clearly indicates that arms supplies were used as an instrument of Soviet regional policy.

Thirdly, the Soviets always insisted on sending their personnel with new equipment. Despite the fact that Nasser requested more Soviet advisers immediately after the 1967 defeat, evidence suggests that the idea was initiated by the Soviets. In any case, Nasser was keen to receive advisers. When Nasser appeared determined to start operations
against Soviet advice, however, the Soviets started to be concerned not to increase their level of involvement. In addition, friction between the Egyptians and the Soviet advisers in the Armed Forces started to surface shortly after their increased arrival in the wake of the 1967 War, causing the Soviets to review this policy. Later, however, faced with the dilemma of preventing Egypt from collapse following the intensive Israeli raids into the depth of Egypt, the Soviets decided to send Soviet crews for the weapons which were provided to Egypt. (43)

Finally, the USSR deliberately declined to provide the Egyptians with military items which would help convert some static defensive weapons into mobile ones. For example, the Egyptians were denied the SAM-6 long-range search, early warning and target acquisition radar (long track), which is a mobile radar. Instead, the Egyptians used Flat Face radar which is not a mobile system. (44) This denial of certain items which could have given the Egyptian forces more mobility forced the Egyptians to purchase these items by proxy (via other Arab countries) or from western sources. Examples of these were the jeep-type and half-track vehicles. (45)

Spare-parts Supply Policy.

Closely tied to Soviet arms supply policy was the Soviet spare-parts policy with its complicated and slow procedures. More important was that formulating supply policy and deciding inventory levels of different items were carried out solely by the Soviets. (46) Since
military planners in Moscow had never tested some systems in combat, their estimates were bound to be theoretical. This resulted in short supply to Egypt of high turnover items, and frequently in surplus supply of long-life ones during the War of Attrition. It was inevitable that this would create more problems for the Egyptians in raising the availability ratio of their aircraft and air defence systems. This problem was, however, of less relative significance for the Air Defence due to the increased number of weapon systems, as the Egyptians could spare more systems to take parts from.

Spare-parts supply was also affected by the level of Soviet-Egyptian relations. For example, the Soviets stopped supplying Su-7 aircraft tyres to Egypt in 1971 when relations between the two countries were tense. (47) Nor were the Soviets helpful with regard to Egyptian attempts to improve maintenance capabilities. It took the Egyptians a very long time to convince the Soviets of the wisdom of overhauling aircraft engines in Egypt rather than the USSR. Although the Egyptians carried out engine overhauls on the few western aircraft they possessed, it was not until 1973 that the Soviets allowed such work on the aircraft which they supplied. Moreover, the Soviet Union and all Eastern bloc countries declined to assist Egypt in the local manufacture of air-to-air missiles, which the Egyptian military industries would have been capable of manufacturing if provided with some sensitive items. (48)
The active Soviet intervention in Egypt in March 1970 did not, as might seem at first, reflect a departure from the principles which had guided Soviet policies towards Egypt after 1967; rather it took place when two of these principles conflicted. Acceptance of the risk of confrontation with the US indicated that the Soviet leadership viewed its stake in the Middle East as high and worth defending.

After the 1967 War, the Soviets took steps to influence Egypt against starting a new war with Israel soon. When the Egyptians did start the War of Attrition, the Soviets tried to secure maximum control of Egyptian military activity. By a physical presence in Egypt and by restricting arms supplies to those of a defensive nature, the USSR hoped to prevent the Egyptians from escalating the war or contemplating a cross-Canal attack that might lead to another defeat and bring down Nasser's regime. (49) The introduction of the Israeli Air Force from 20 July 1969 triggered the Soviet concern about a possible Egyptian defeat. The Soviets saw that the fuller introduction of the IAF had cancelled out all Egyptian advantages in the War of Attrition. As long as the War of Attrition remained a ground war, the Egyptian succeeded in exploiting the strategic superiority arising from their ability to mobilize more forces than Israel. Once the War of Attrition became an air war, Israeli air superiority altered the strategic balance. (50) Indeed, the destruction of the Egyptian anti-aircraft system, including the SA-2 missiles, along the Canal was the turning point, for it was this more than anything else that proved
Israel's real strategic superiority. The Soviets did not want to see their efforts to rebuild Egypt's defences hampered by Israeli air operations. This would give Nasser's opponents the opportunity to blame Egypt's vulnerability on its ties with the Soviet Union. The Soviets therefore had strong incentives to counter-balance Israel's absolute air superiority.

Thus, in December 1969 Nasser's personal emissary Anwar Sadat, accompanied by Egyptian War Minister Fawzi, arrived in the Soviet Union for talks with the Soviet leaders. In Kosygin's speech in honour of the Egyptian visitor on 10 December, the justification for the Soviet Union's increase in support for Egypt was clearly indicated. In the words of the Soviet leader, 'Israel believes that extension of the conflict will lead to the breakdown of internal stability in the Arab countries and to the rupture of friendship between the Arabs and the Soviet Union'. The Soviet Union, Kosygin said, would take active measures in strengthening the defence capability of the UAR [the United Arab Republic - Egypt's formal name at that time] and the other Arab states. (51)

Upon the Israeli decision to extend the air war to Egypt's heartland and once the areas around Cairo were subjected to bombing, Nasser flew to Moscow on 22 January 1970. The Soviet leaders promised Nasser that they would come to his aid, but that this would take some time. (52) In February, the Kremlin tried to persuade the United States to put an end to the Israeli in-depth raids, but the American response did not leave the Soviets much choice. (53) Soviet status and interests

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in the Middle East were sufficiently at stake to justify their taking action themselves to stop Israeli raids. (54)

It is controversial whether it was the Israeli in depth raids which brought about the Soviet military intervention, or whether the Soviet decision to intervene in the war had taken shape before the start of these air raids. Some suggest that the Soviet decision took place towards the end of 1969 and that Nasser's visit only hastened its implementation, while others suggest that it was taken during Nasser's secret visit and was prompted by the Israeli in-depth raids. (55) Nevertheless, despite the possibility that the Soviet leaders may have taken a decision in principle regarding intervention before the Israeli deep raids, the fact remains that this intervention took place after the air raids had begun.

The Soviet expeditionary force consisted of air space defence elements placed under the command of a special headquarters made up of key personnel from the Odessa Air Defence District in the USSR. Under this command were two complete air defence regiments, including specially attached maintenance and electronic workshops. Later, two squadrons of SU-15 (FLAGON) interceptors, including ground crew arrived in Egypt to be followed subsequently by up to six squadrons of MiG-21 interceptors (about 100 of these MiG-21s interceptors had already been ordered by Egypt, and so their ownership was instantly transferred to the Egyptians). (56)
Commitment of Soviet personnel in a combat role outside the Communist camp was unprecedented. Before taking this step, the Soviets first assured the United States that the introduction of Soviet fighting personnel was essential to defend Egypt and that their involvement was only defensive – to curb the deep penetration raids rather than to interfere in the war along the Canal. The new SAM-3 batteries, the United States was informed, would be emplaced only in the developed areas of central Egypt – around Cairo, Alexandria, and the Aswan Dam. (57) Israeli bombing of the Abu Za`ab'al metallurgical plant at El-Khanka on 12 February, which killed about eighty workers and injured an additional one hundred, and the bombing of the Baher Al-Bagar school on 13 March, which killed about thirty pupils, brought international condemnation, and protest against Israeli actions. On 23 March, the United States suspended its shipment of Phantom and Skyhawk aircraft to Israel. (58) Given these circumstances, the Soviets stepped up their military intervention. Unlike the case of the decision to deploy Soviet-operated SAM-3s, the Soviets did not see fit to inform the United States of the dispatch of combat pilots to Egypt. (59)

The immediate aim of the Soviet military intervention in the war was to ensure the survival of the Nasser regime in Egypt, which the Soviet leadership hoped to achieve by stopping the Israeli deep raids. But once the Soviets intervened, they wished also to pursue an additional aim: to achieve a strategic balance on the Canal front to improve Egypt's bargaining position in negotiating a peaceful solution to the Middle East conflict.
In early April 1970, partly in response to the American halt in aircraft deliveries and partly due to the new Soviet air space defence deployments, the Israelis stopped deep raids into Egypt. Improved results in the air war against Israel became evident in June and July 1970, as the Soviets and Egyptians rapidly re-established SAM positions along the Canal in spite of heavy Israeli attacks.

The Soviet-Egyptian success in re-establishing the SAM defences was achieved by the speed at which these sites were set up, which often surprised Israeli raiders. Moreover, new weapons were introduced such as the SAM-3s and improved models of SAM-2, which enabled the Egyptians to devise new tactics, such as the ripple firing technique. (60)

By the end of July, rising Israeli air losses along the Canal convinced Nasser that some kind of strategic balance had now been achieved in the Canal zone. The Soviet-Egyptian success in establishing the SAM box west of the Canal demonstrated to the Egyptians that a good integration of air defence elements could deny enemy air superiority and provide air cover for troops - a result that pleased the Egyptian Air Defence. A far more significant result of the Soviet intervention was that the offensive-defensive imbalance in the Egyptian force structure had become even greater. Although the Soviet intervention boosted both ground-based air defences and interceptor aircraft, after the Soviets' departure, there were still no pilots to fly the additional interceptors and the Egyptians only managed to operate the missiles. The introduction of increased numbers of SAM-3
batteries and other air defence elements dictated another rapid expansion in the Egyptian air defence in a very short time. In about one year (1970-1971), the Egyptian strength in SAMs was doubled. (61)

It is, finally, interesting to compare the Soviet reaction to the Middle East conflict with that in the contemporary Vietnam War, since in both cases American and Soviet weapons were competing (that is, American aircraft against Soviet anti-aircraft weapons). The Soviets intervened directly in Egypt while they did not in Vietnam. In both cases American aircraft seemed capable of beating Soviet air defences, but there the similarity between the two cases ends. There were three main differences which explain the reticence in Soviet behaviour in South East Asia. First, the American interest in Vietnam was stronger as they were themselves involved. Any Soviet direct involvement in Vietnam might have led to a real and dangerous confrontation between the two superpowers. Second, the Vietnam regime did not show any sign of weakness during the long struggle in Vietnam. On the contrary, Vietnamese resistance was demonstrated by the increased American aircraft losses to air defences. Third, the topography of Egypt and Vietnam in terms of air power operations is very different. In Vietnam, the jungles, the nature of targets and the distances made it extremely difficult for American air power to achieve decisive rapid effects. The open nature of Egypt, on the other hand, with its developed areas within the reach of Israeli fighters, enabled Israeli air power to inflict heavy damage and bring about immediate effect.

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Soviet Doctrines and Weaponry

Over the years, Soviet weapons, doctrines, and training procedures influenced Egyptian military thinking towards greater reliance on air defence. This influence is best seen in the way the structure of the Egyptian Air Force and Air Defence had developed by the end of the reconstruction programme.

Soviet Operational Advice.

The Soviets believed that air defence was an essential component of the modern combined-arms force, and therefore made the Air Defence of the Army a separate branch, on a level with the Tank, Motorised rifle and Artillery branches. (62) Unlike the Egyptian Air Defence, Soviet Army air defence operations are designed to cover a land offensive. The mobility, tactical flexibility and combat power of Soviet air defence weapons enable the Army's air defence forces to provide effective air protection. (63) Conversely, the air arm has never been placed as high in Soviet military thinking as in American or British thinking. The Soviet Air Force was never the outstanding military arm and was not decisive in the major battles which decided World War II. (64) After that war the Soviets had no active combat experience until their intervention in Egypt towards the end of the War of Attrition in 1970. Soviet involvement in the actual fighting against the Israelis forced them to devise new tactics and to modify many of their weapon systems. (65) Thus, the Egyptian Armed Forces were trained by men with little or no combat experience.
The Soviet advisers in Egypt never believed that the EAF was in a position to challenge the IAF, and therefore advised concentrating on ground-based air defence. On Soviet recommendation, Egyptian pilots were not allowed to participate in the War of Attrition. The Soviets believed that available Egyptian pilots should study and train hard for two or three years before being allowed to meet the Israelis in the air. This advice contradicted basic assumptions of the EAF reconstruction plan, and was not taken by the Egyptian leadership which was under pressure to start operations. In addition, this advice caused frustration and despair among the Egyptian pilots, who were eager to participate and prove themselves in combat after being blamed for the defeat a few months earlier. For example, in December 1967, the Egyptians discovered that the Israelis had constructed a landing strip in Sinai close to the Bitter Lakes, and the Air Force was keen to attack it. When Egyptian pilots were refused permission, they conducted a 'sit-in' strike which lasted four days. (66) Egyptian pilots did succeed in flying on combat missions despite Soviet advice, but their heavy losses forced them to change their attitude and tactics during the War of Attrition. By way of contrast, the Soviets encouraged the development of air defence. Thanks to generous supply, the inventory of SA-missiles increased seven-fold in six years.

Soviet Training Approach

The Soviet military mission in Egypt was another instrument of implementing Soviet policies and exercising influence over Egyptian
military affairs. Estimates of the strength of this mission vary between 1,500 and 3,000 advisers in 1969. Later, however, upon Nasser's request, the Soviets increased their mission and by late 1970, it was estimated to contain between 15,000 and 20,000 men. The Soviet military mission in Egypt consisted of three categories; advisers, specialists, and 'friendly units'. Soviet advisers were posted throughout the Egyptian Armed Forces, from the top level down to battalion and air squadron level. They were drawn from regular service; apart from their main role in general training, they advised Egyptian commanders on all matters concerning their units. All advisers in Egypt were commanded by the most senior adviser, who had direct access to the President, functioning at the same time as an adviser for the Minister of War who was also C-in-C of the Egyptian Armed Forces. Soviet specialists in Egypt consisted mostly of men assigned to maintenance workshops, particularly in the Air Force and Air Defence. The affairs of the estimated 300 specialists were looked after by the Soviet embassy in Cairo. Unlike the first two categories, the Soviet 'garrison' in Egypt, consisting of active combat personnel, operated as an independent air space defence sector, complete with pilots, missiles, radars, anti-aircraft guns, ground services and maintenance crews, had no training role and did not mix as much as the other categories of advisers with Egyptian military personnel.

The attitude of Soviet personnel came under heavy criticism from the Egyptians, especially from junior officers. Soviet advisers were rude, impatient and persistently checking. This behaviour,
combined with their increasing interference in internal military affairs such as the appointment of commanders and the retirement of officers, resulted in increased friction with Egyptian officers and caused further complaints and discontent. (72)

The Soviet advisers' training performance was characterized by a slow and methodical approach. Consequently, Egyptian senior officers, who still smarted from the humiliation of the June War, and younger officers, who were impatient, failed to comprehend the Soviet approach to training and the advisers' hesitation in supporting the idea of launching them into battle. The advisers observed a new spirit among the young, highly-qualified Egyptian officers and conscripts and their increased ability to absorb Soviet weapons, but had a low evaluation of Egyptian readiness to launch offensive operations. Indeed, the Soviets had a low opinion generally of the Egyptian Armed Forces and felt that they needed to spend more time in hard training before commencing operations.

The Egyptians, on the other hand, were not impressed by the Soviet training approach and personnel performance. General Musallam noted that the quality of the Soviet advisers in air defence varied but in general, because they lacked combat experience, their training procedures were either obsolete or 'by the book'. He added, 'We were learning together in fact'. (73) In the Air Force as greater numbers of Soviet advisers were assigned to training, Egyptian pilots also noted that these advisers were old for flying and, not having seen combat in their service, were slow, procedural and showed a lack of
aggressiveness. In support of their case, Egyptian pilots argued that Soviet pilots were accusing them of not being able to learn from experience until the first encounter between Soviet fighter pilots and the IAF took place on 30 May 1970 when, within seconds, five MiGs were shot down. (74)

It seems, however, that unlike the Air Defence which was expanding fairly quickly, the Soviet arms supply policy and the slow training procedures were a delaying factor in rebuilding the Air Force. To illustrate, in the Air Force reconstruction plan, it was essential that a major effort should be concentrated on preparing new pilots and improving standards in general. (75) The EAF training department, in cooperation with the Soviet advisers, devised short training programmes to retrain available pilots. In planning these courses, the Soviet advisers insisted that they must be detailed and extend for a long period of time. The Egyptian side not only felt that these long courses were unnecessary and could therefore be curtailed, but was also pressed for time to produce additional new pilots according to the plan. These different views forced the EAF Commander to intervene in the discussion of the course details with the Soviet advisers, with the result that course times were cut by half on occasions, causing the EAF Commander to feel that Soviet advisers were wasting Egyptian time. (76)
The Structure of The Egyptian Air Force

By the end of the Egyptian Armed Forces' reconstruction programme in 1971, the structure of the EAF was defensively oriented. This is evident from the high proportion of interceptors (about half of the whole EAF strength) and from the fact that of those ground attack aircraft which the Soviets did supply, few were modern models such as the Su-7.

In 1971, the EAF consisted of 25,000 men operating about 600 aircraft including: 300 MiG-21s, 200 MiG-15s/17s, 110 Su-7s, 18 Tu-16s and 25 Il-28s. The MiG-21 interceptors thus represented 46 percent of the EAF strength. This ratio is high compared with the Israeli 19 percent in 1971. Moreover, the Israeli policy of purchasing multi-role aircraft enabled them to utilize their aircraft for more than one role, according to the battle situation. Thus, while the F-4 (Phantom) was used as an air superiority fighter when required, both it and the Mirage 3 interceptor could be and were used frequently as strike aircraft.

Unlike the Israeli interceptors, the Egyptian MiG-21 was purely a defensive aircraft that suffered from serious shortcomings. The MiG-21 did not carry a large payload of weapons. Of course, actual loads depended on mission, target and route, but the theoretical maximum for Egyptian MiG-21s was 1,500 kg of weapons in ground attack missions. If all 300 Egyptian interceptors were used for ground attack, in one sortie they would deliver 450 metric tons of munitions,
whereas it took only 62 Israeli Phantoms to carry the same payload for an even greater distance. (80)

All Soviet aircraft, and the MiG-21 in particular, were critically short on fuel capacity by western standards. Although the MiG-21 was designed to carry about 2600 litres of internal fuel (about 690 US gallons), the usable fuel capacity was 475 gallons - one-fourth as much as an F-4 and one-half a Mirage 3, for example. In the MiG-21, the engine bulk was in the extreme tail, while the tankage lay well forward in the wing and fuselage. As fuel was consumed, the centre of gravity (CG) moved back until when 210 gallons remained, the CG passed beyond the rear limit, and the aircraft became unflyable. (81) This serious defect made a normal training flight for an Egyptian pilot last, on average, just over 30 minutes. This affected the combat training of Egyptian pilots and reduced the accumulation of flying experience. (82)

Although the MiG-21 responded well to low-level combat manoeuvres at low speed, its performance in air-to-air combat was not without deficiencies. At 0.6:1 (just over 0.7:1 with afterburner), the thrust-to-weight ratio of the MiG-21, vital for climb, acceleration, and tight manoeuvres was less than the ratios obtained in combat by the Israeli Mirage 3 and F-4. (83) Furthermore, the MiG-21 could barely reach Mach 2 before running short of fuel and, even using the recommended climb-accelerate procedure, the MiG-21 could only climb to a maximum of 46,000 feet. (84)
Finally, although the Egyptian interceptor force enjoyed numerical superiority over the Israeli Mirage 3, the latter made up for this by carrying more air-to-air missiles with longer range. The MiG-21 carried two Soviet air-to-air Atoll missiles with a range of about three to four miles, while the Israeli Mirage 3 (Barak) carried four American Sidewinder, French Matra or Israeli Shafrir of similar range. The Israeli F-4s were, moreover, capable of carrying eight air-to-air missiles: four American Sparrows (16 mile-range) and four Sidewinder or Shafrirs.

Egyptian numerical superiority in purely interceptor aircraft meant that the Egyptians could scramble greater numbers to engage targets, achieving numerical advantage in a specific time and place. This advantage, however, was greatly reduced by the limited range and the aircraft deficiencies. The range limitation forced the MiG-21s to operate close to their bases, so that they were best suited for airfield defence. Their inability to provide top cover also rendered the Egyptian bomber force extremely vulnerable.

The Egyptian ground-attack force formed about half of the EAF strength in 1971. Despite the fact that the strength of both Egyptian and Israeli ground attack forces was roughly equal, Egyptian capacity to deliver weapons was only half of that of the Israelis. In total, maximum theoretical Egyptian capacity was about 550 tons per sortie. This low capacity was due to the smaller payload that Soviet ground attack aircraft carried compared with American ones. For example, the American A-4 ground attack aircraft could carry a maximum payload of
3,720 kg., while its Egyptian counterpart, the MiG-17, could carry only 1,000 kg. The more modern Su-7, with its dedicated ground attack role, could carry about 3,000 kg. of weapons, but it constituted only about one third of the Egyptian ground attack force.

Another main feature of the EAF structure was that with the exception of modified MiG-21s, about two-thirds of the aircraft in its inventory were old (from the 1950s generation). (85) By way of contrast, in 1971 few Israeli aircraft were old; rather, 74 percent were new (Mirages, A-4s and F-4s, the 1960s generation). The problem of ageing aircraft severely affected the Egyptian ground attack force, as more than half of the force were obsolete aircraft. Thus, 200 out of 310 aircraft were MiG-15s and 17s, with 110 Su-7s. MiG-17s in the Egyptian inventory were either surviving ones from the early deliveries of the 1950s, or from the ones quickly resupplied after the 1967 War, which were pulled out from the service of friendly air forces. Moreover, although the Su-7 was supplied to Egypt as recently as 1967, it was old in Soviet service, going back to the 1950s also. (86) The problem of obsolescence was also evident in the phasing out of half of the MiG-15s and 17s between 1971 and 1973. (87)

Having slight numerical superiority in ground-attack forces, the Egyptians had the advantage of being able to sustain a greater attrition rate in aircraft than the Israelis. Committing Egyptian forces effectively, however, was complicated by the light payload of aircraft, their limited range and the need for top cover. Unable to strike deep, the Egyptian problem was that directing effort to close
support or against enemy first echelon units meant operating inside the SAM umbrella, which required closer coordination with the Air Defence and increased the risk element. More important, operating under the SAM coverage would give the IAF an opportunity to operate in this area too. Given these limitations, the least hazardous option was to direct EAF effort to sudden surprise attacks beyond the SAM cover, against the enemy second echelon forces, regardless of the effectiveness of such strikes.

Unlike the interceptor and ground-attack force, the strength of the Egyptian bomber force decreased between 1967 and 1971, from 70 to 43, the percentage falling from fifteen to eight percent of total air strength. After the 1967 War, the Egyptians realized that the strategic threat they thought they had possessed lacked credibility. Although Egyptian Tu-16s were finally provided with 50-mile range subsonic 'Kennel' air-to-surface missiles, these were vulnerable to interceptor aircraft and Hawk anti-aircraft missiles. (88) Moreover, Egyptian bombers had no penetration capability because they were slow and needed air cover, which the MiG-21s could not provide at such long distances. In any case, Egyptian bombers did not have the chance to attempt penetration of the sky of Israel in the 1967 War. The one instance of attack was by a single Iraqi Tu-16 that bombed Natanya but was lost after dropping a few bombs. (89)
Egyptian Ground-Based Air Defence

By 1971, Egypt had acquired about 135 batteries of SAMs of all types, with about 680 launchers. These included 70 SAM-2 batteries with 420 launchers and 65 SAM-3 batteries with 260 launchers. There were five Soviet-manned (and owned) batteries of SAM-6s and a few SAM-4 batteries deployed in Egypt. The Egyptian Army also had at least 2,000 SAM-7 launchers (including both shoulder-held and vehicle-mounted types). In addition, the Egyptians had about 2,500 AA systems of different calibres. The most effective of these were the estimated 150 ZSU-23-4 radar-guided guns. Other systems included 37mm, 57mm, 85mm, and 100mm calibre guns. (90)

Increased Egyptian confidence in the air defence system by 1971 was not only due to the six-fold increase in the SAM inventory. Rather it was a cumulative consequence of the following factors. First, the extensive combat experience gained by air defence personnel during the War of Attrition increased their confidence in their weapons. The experience of SAM-2 crews, moreover, enabled the Egyptians to establish and expand SAM-3 units in a relatively short period of time by borrowing personnel from the former. Second, the Egyptian success in establishing the SAM box towards the end of the War of Attrition, posing a strong challenge to the IAF, boosted Egyptian morale. More significantly, Egyptian success was accompanied by the introduction of new modern SAMs and ECM equipment, with the result that the Egyptians felt more confident in their air defence. Thus, dense deployment of
SAMs along the Suez Canal enabled them to provide air cover for the major concentration of ground forces.

Despite this huge growth and increased confidence, the Egyptian air defence suffered from certain shortcomings. A major disadvantage was that more than 95 percent of Egyptian SAMs were SAM-2s and 3s, which were largely immobile systems. Their huge size, with their heavy radars and command centres, required a long time for redeployment. Moreover, this size increased their vulnerability to air attacks, especially on the move. As they were, Egyptian SAMs were capable of providing air cover from their fixed positions, but moving them forward across the Canal in support of a crossing operation would pose problems, especially as their wheeled carriers would be completely dependent on the few roads in Sinai, with longer time on the move and more exposure to enemy air action. Enemy artillery fire, especially from long-range guns, was another main factor in deciding SAM deployment. Moving SAMs forward across the Canal before the ground forces had pushed back Israeli troops at least 30 miles would increase the risk of their being destroyed by artillery. And finally, had the Egyptians managed to deploy SAMs in Sinai, preparing adequate shelters for them would be a difficult task because of the long time needed and the risk of being exposed to Israeli air attacks and artillery.

In contrast, the one mobile SAM system in Egypt in 1971 was the SAM-6, which remained under Soviet ownership and was operated by a Soviet-manned brigade in Aswan far from the front. Therefore, its forward deployment in case of war would involve more than an Egyptian
military decision. The additional disadvantage here was that the Egyptian-owned SAM-2s and SAM-3s were effective only against high level targets, whereas the SAM-6 provided low to medium level cover. Moreover, the number of ZSU-23-4 anti-aircraft guns owned by Egypt was too small to allow effective integration with the large numbers of high level SAMs, particularly in view of the increased need for air defence weapons to accompany field units. (92)

Another major disadvantage was that the extensive use of ground based radar-controlled air defence systems carried with it a complete reliance on the electromagnetic spectrum. Therefore, a major vulnerability of the Egyptian air defence was that it depended to a large extent on electronic equipment which could be neutralized by active electronic countermeasures (ECM). Although advanced EW equipment had been introduced to Egypt as recently as 1970, the Israelis were, in general, better prepared for electronic warfare.

An additional problem was that at least 40 percent of Egyptian SAM-2s and 3s and most of the advanced EW equipment were still operated by Soviet personnel in 1971. (93) The intensive recruitment effort for the air defence was underway, however, and, with the exception of advanced EW equipment, the Egyptian military command judged that the new crews would soon be ready to replace the Soviet ones. Finally, all Egyptian ground-based air defence systems had technical deficiencies and limitations. These will be discussed in detail in the 1973 chapter.
Egyptian Interests and Arguments.

Having so far discussed the Soviet policies towards Egypt during the period 1967-1970, the question which poses itself here is what were Egyptian perceptions, interests and arguments regarding the Soviet policy in Egypt? There follows a brief discussion of the views and stands of different Egyptian groups.

On 9 June 1967, the humiliated Nasser announced his resignation. The announcement was met with massive popular demonstrations calling on him to remain in office. At this critical time, the Soviet leadership cabled Nasser to urge him to retract his resignation, which he did 48 hours later. Nasser was now torn between his willingness to fight in order to maintain his image as a great hero, and the knowledge that his desire to rebuild the Egyptian Armed Forces, which required changing the key personnel in its top hierarchy, would involve confrontation with his powerful rival Marshal Amer, deputy Supreme Commander of the Armed Forces, and his supporters. Nasser's dilemma was exacerbated by his realization that relying solely on the Soviets for rebuilding Egypt's military strength would mean that they would remain in control through the granting or withholding of Egypt's urgent military needs. (94) Given the suspension or coolness of Egypt's relations with western countries, Nasser had no alternative but recourse to the Soviets, who lost no time in demonstrating their solidarity. (95)
Nasser's relations with the Soviet Union were not without suspicion and mistrust on his part. Against Soviet advice which was based on the premise that the Egyptian forces were not yet ready for more than limited defensive operations, Nasser started the War of Attrition in March 1969, with the result that the flow of Soviet arms was slowed down. (96) In his discussion with the Soviet leaders in January 1970, Nasser warned that if his demand was not met, he would leave his office for others who might seek better relations with America. Implied in this was that the Soviets could lose Egypt as the main Soviet foothold in the region. (97)

Nasser's attitude towards the Soviets was contradictory. In public, he was appreciative of the Soviets and grateful for their support. In most of his speeches after 1967, he praised the Soviets and magnified their deeds. He went as far as to say that, 'Without the Soviets, Dayan could have been sitting in Cairo'. (98) In contrast, he complained bitterly to his close circle of friends about Soviet attitudes and in particular, of their refusal to supply offensive weapons and their slowness in making deliveries. On one occasion, he complained to Yugoslav President Tito of the way the Soviet leadership treated him, saying, 'Please tell the Soviet Union that I would be more willing to accept a defeat - anything, in fact - than to be treated like this'. (99) Nasser also described his relationship with the Soviet Union as a 'hopeless case', and commented at one point that 'all the cards of this game are in America's hands', meaning that only the US could exert pressure on Israel to withdraw from the Arab territories occupied in the 1967 War. (100) When Sadat came to power
following Nasser's death, however, his initial attitude towards the Soviets was two-faced, similar to that of Nasser, but his response to the Soviet refusal to supply offensive weapons (or 'deterrent weapons' in his terminology) was different: he sought a new approach to solving the Middle-East problem. At the heart of his approach was his realization that to neutralize the Americans in an Egyptian attempt to change the status quo by force, the Soviet forces and personnel must leave Egypt in advance. (101)

The impact of the Soviets on the Egyptian institutions, and in particular the Armed Forces and their thinking, had given rise to a wide variety of views in Egypt. Three main trends can be identified: first, there were the pro-Soviets, who saw in the USSR the only sincere ally of Egypt, supportive in all fields. This group concluded that the reluctance of the Soviet Union to provide Egypt with advanced weapons was understandable in view of the inability of Egyptian forces to absorb and use such weapons effectively. They argued that receiving weapons faster than the ability to organize training would lead to placing them in storage, as was the case prior to the 1967 War. The most prominent leaders who represented these views were Ali Sabri (former vice-President and Prime Minister), and General Fawzi (Minister of War and C-in-C of the Egyptian Armed Forces 1967-1971). Later, however, Sadat arrested both leaders, describing them as 'Moscow's men in Cairo'. (102)

Secondly, there were the anti-Soviets, who saw in the USSR a modern colonial power guided by its own interests. They were critical of
Soviet policies towards Egypt, that is of denying offensive weapons and intentionally slow training procedures. They believed that there was a deliberate policy to keep a tight rein on the Egyptians. Furthermore, they protested against Soviet snobbish treatment of Egyptians, especially inside the Armed Forces where morale should be high. In general, this group mistrusted Soviet intentions in demanding strategic Egyptian concessions, and suggested that Egypt should diversify its weapon sources. This group was best represented by Abdul-Latif Baghdadi (a member of the presidential council), General Abu-El-Izz (former EAF Commander), and General Sadek (Minister of War and C-in-C of the Egyptian Armed Forces 1971-1972).

Finally, there was the group who may be described as the 'compromisers' (middle-of-the-roaders). Their perception of the Soviet Union was that it was not a charitable organization, but rather a superpower seeking to gain benefits in return for supporting Egypt. As a result of Egypt's limited options, they considered the Soviet-Egyptian relationship a vital strategic necessity. Therefore, it should be preserved and strengthened, and Egypt should try to benefit as much as possible from the situation. Both Presidents Nasser and Sadat could be identified with this group. Among military commanders at the time, General Shazly (the Chief of Staff) and General Gamasy (Director of Operations) held similar views. Mohammad Hasanaín Heikal, Nasser's confidante and editor of the Al-Ahram newspaper, was the most articulate in arguing and defending this line of thinking.
Before concluding this discussion of Soviet-Egyptian relations, however, it is worth noting that there were few Egyptian misconceptions about the Soviet Union and its capabilities. First, the Egyptians were obsessed with the Israelis' devastating pre-emptive strike of 5 June 1967, and with the destruction of most EAF aircraft on their bases in the 1956 campaign. This had a profound effect on Egyptian military thinking, with their first priority being to achieve the degree of air superiority that in turn would enable Egypt to neutralize Israeli bases. Egyptian planning was highly optimistic as they wanted to have a large mix of aircraft and air defence simultaneously, in a short period of time. This resulted in excessive Egyptian demands for weapons which the Soviet Union found unjustified and beyond Egyptian capacity to absorb. (103) Egyptian excessive demands, however, may have been encouraged by the low cost of Soviet weapons and the long-term repayment arrangements. (104) Second, and connected to that, was the exaggerated Egyptian idea of the production capacity of the Soviet Union. The Egyptians assumed that all Egypt's weapons requirements were always available to be handed over. Emphasizing this Egyptian misconception, Heikal pointed out that even if the Soviet Union's annual production of tanks, for example, was double that of the United States (720 a year according to his estimate), there was a tendency to forget the Soviets' commitments to supply not only their Warsaw Pact allies, but also eight or nine other Arab countries besides Egypt, not to mention African countries, India, Cuba and Vietnam. (105)
Conclusion.

Driven by its own interests, the Soviet Union adopted a policy of gradual introduction of defensive weapons which they considered sufficient for Egypt to defend itself, while preventing it from taking a hasty decision to go to war. The Soviet doctrines and concepts of war had their effect on the Egyptian Armed Forces through the supply of weapons, training and advice to the Egyptian General Staff. The Soviets encouraged the Egyptians to rely more on air defence in neutralizing the IAF through the generous supply of air defence weapons, and through withholding their support for the EAF in achieving their ambitious plan. All these factors were reflected in the structure of the Egyptian Air Force and Air Defence by the end of the reconstruction programme in 1971. The Soviet expeditionary force in Egypt in 1970 demonstrated to the Egyptians the value of air defence, thus reinforcing the idea of accepting the goal of local air superiority. Moreover, as the ownership of most of the defensive weapons of the Soviet expeditionary force was gradually transferred to Egypt, the balance in the Egyptian force structure was affected, with the gap between Egyptian air defensive and air offensive capability becoming wider in favour of the defensive.
References

1. For more details on Soviet moves, see Sella, (1981). In chapters one and two, the author discusses Soviet strategic problems and their strategic imperatives towards the Middle East.

2. For a full discussion of the circumstances which enabled the Soviets to penetrate into the Middle East, see Heikal, (1978), pp. 20-41. See also Rubinstein, (1977), pp. 3-8.

3. The most prominent example of these military pacts was the 'Baghdad Pact' which came to be known, after the Iraqi revolution in 1958, as the 'Central Treaty Organization' (CENTO), and which included the USA, UK, Turkey, Iran and Pakistan.

4. Up to the summer of 1955, Nasser had maintained contacts with the Americans at every level, including sending an Egyptian military delegation to discuss Egypt's arms needs. Later, however, a mediation effort between Egypt and the Soviets was made by Chou En-lai, the Chinese Prime Minister at the time, following a meeting during the Bandung Non-Alignment Conference in the spring of 1955. On Chou's recommendation, the Soviet Union finally agreed to supply weapons to Egypt. Sadat revealed that after being turned down by the USA, Egypt requested weapons from the USSR early in 1953, while Stalin was on his deathbed. The request was turned down. Sadat, (1978), p.141. Besides confirming the mediation effort, Heikal referred to an earlier arms deal between the two countries (in 1768). Heikal, (1978), p.35.


6. In his 1983 book, Heikal tried to justify Nasser's aims in his relations with the Soviets, and confirmed that Egypt was the mainstay


9. Nasser himself contributed to the criticism of the Soviet Union: in his 'resignation' speech of 9 June 1967, when he said that Egypt's defeat was partly due to its heeding Moscow's urgent request not to start a war. Soviet fears over the possibility of Egypt turning to the USA may have been reinforced by Nasser's nomination as his successor of a colleague in the RCC, Zakaria Mohi-Eddin, who was known to be pro-western. This also came in the statement broadcast by Nasser announcing his resignation. Heikal discusses in detail the origins of the anti-Soviet sentiments in Egypt and in the Arab World. Heikal, (1978), pp. 176-184.


16. Heikal revealed that a 'thinking aloud memorandum' prepared for Nasser's visit to Moscow on June 1970 stated that the cautious moves by the Soviets in the military field gave the Soviet Union an opportunity to achieve some of its aims in Egypt and other Arab
countries, such as using Egypt to secure entry to some Arab countries like Libya and Sudan, altering the structure of some Egyptian institutions to make sure that Egypt would continue to pursue a pro-Soviet policy, and solving the problem of anti-Soviet sentiments in the Armed Forces by liquidating the anti-Soviet element. Heikal, (1978), pp.200-201.

17. Sella has concluded that both superpowers' policies in the Middle East during the War of Attrition were characterized by 'mutual interest in maintaining the status quo'. Sella, (1981), pp.26-27.

18. On many occasions Nasser's view conflicted with Soviet leadership views, which caused suspicion of Nasser's attitude in the Soviet Union. For more details, see Heikal, For Egypt not for Nasser, (1983), pp.177-180.


25. Ibid.


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27. Ibid., p. 69.


29. See, for example, Fawzi, (1984), p. 349.


31. The places and dates of these meetings were: Cairo, 21-23 June 1967; Moscow 29 June 1968; Moscow 1 December 1969; Moscow, 22-25 January 1970; Moscow 29 June 1970.


34. For the details of this arms deal, see Fawzi, (1984), p. 351.

35. All Soviet-Egyptian summit meetings were attended by top senior officers on the Egyptian side with their arms shopping list. For details on those meetings see Ibid, pp. 347-355.


37. According to the 'thinking aloud memorandum' prepared for Nasser's visit to Moscow in June 1970, which is published by Heikal, there was an obvious contradiction between Egypt's interests and those of the Soviet Union. For Egypt, air cover for its forces was so important that there must be no delay in its completion. But the Soviets, while understanding the importance of air cover, also saw its dangers. It was therefore in their interest to delay providing it until they had made a careful appreciation of the situation. Heikal, (1978), p. 199.

On losing faith in the Soviets, see Sadat, (1978), pp. 219-231; see also Abu-El-Izz 'Memoirs', Al-Liwa, 25 November 1987. Abu-El-Izz claims that President Nasser said in a meeting with military

38. According to Fawzi, two ECM centres were provided by the Soviets; one centre for the Canal zone and the other for the central zone. Both centres arrived on August 1970. A Soviet SAM-6 brigade also arrived in Aswan on August 1970. Fawzi, (1984), p. 355.


41. For more details on Soviet views and stands about the start of the War of Attrition, see Rubinstein, (1977), chapter three, pp. 66-89.


43. O'Ballance reported an incident which shows that Soviet advisers were controlling most of the sophisticated weapons and equipment they provided, although Egyptians manned them. He states that, 'After landing at El Khafayer, the Israelis attacked the SAM-2 missile base there, and the Egyptian officers demanded to be allowed to bring the missiles into action against the Israeli aircraft overhead, asking for the missile fuses, which were held by the Soviet advisers. The Russians refused on the grounds that the Egyptians were neither trained nor ready to engage such a number of Israeli planes. The Egyptians insisted, and the senior Soviet officer went to the top of the bunker to see for himself and was killed'. O'Ballance, (1974), pp. 92-93.


47. Ibid.
48. Ibid.
49. Close Soviet control led to occasional clashes between Soviet experts in Egypt and the Egyptian military, and also between the experts and Nasser himself. For details, see O'Ballance, (1974), pp. 64, 73, 91, 93.
52. Fawzi, the Egyptian C-in-C at the time, promised that the sites for the new SAM-3s would be ready in 40 days. Fawzi, (1984), p. 319.
55. For example, Schiff and Glassman are of the view that the decision in favour of direct Soviet military intervention took place before the start of the Israeli deep raids. Schiff, (1970), p. 209; Glassman, (1977), p. 74. In contrast, Heikal's view is that the Soviet decision was taken in an urgent meeting of the Politburo during Nasser's visit in January 1970. Heikal, (1975), pp. 87-88.
56. For more detail on the composition of the Soviet expeditionary force, see 'The Soviet Intervention in Egypt', Born in Battle, March 1980, pp. 42-44.
58. Ibid., p. 77.
59. Ibid.
60. This technique was expensive, but it did compensate for the loss of accuracy due to speedy installation, and it also better assured the imposition of high Israeli losses, which was wanted at that stage.
63. Ibid. For more details on the development of the concepts and structure of the Soviet air defence, see also Mason and Taylor, (1986), pp.26-35.
69. Egyptian military term for Soviet combat troops.
71. Sella, (1981), p.60. A similar portrait of the Soviet advisers in Egypt was expressed by some former Egyptian officers. For example, in an interview with General Musallam, Cairo, 18 August 1988.
73. In an interview with Musallam, Cairo, 18 August 1988.
75. Egypt's losses in pilots in 1967 were not high since most aircraft were hit on the ground.


79. For the armament capacity of the MiG-21, see Appendix one.

80. The F-4 Phantom could carry a maximum of 7,250 kg. of payload on five points under its fuselage.

81. For more details on the MiG-21, see, for example, Lambert, 'How Good is the MiG-21', U.S. Naval Institute Proceedings, January 1976, p. 100.

82. For example, if the normal training area was five minutes flying time away, then the average dogfight mission could last only about 15 minutes.

83. See Appendix one.

84. For other MiG-21 deficiencies, see Lambert, p. 100.

85. The first appearance of the MiG-15 in combat was during the Korean War, 1951–1953, whereas the MiG-17 entered service in the Soviet Air Force in 1952. The EAF had the MiG-17s just before the 1956 War. The MiG-21 was from the same generation also, but Egypt had received
modified versions of the MiG-21.

86. The first prototype of the Su-7 appeared in 1956, the same year that the first MiG-21 prototype was tested. In 1971, the Soviets had the SU-17/20/22 modern ground attack aircraft in their inventory.


91. According to a former Egyptian Air Defence General, the Egyptians were able to cut down the original time of six hours (plus travelling time) needed to redeploy a SAM-2 or 3 battery, to three hours and 20 minutes. Interview with General Qaramany, Cairo, 23 August 1988.

92. Dupuy estimated that Egypt had about 150 ZSU-23-4 guns during the October 1973 War. According to Shazly, the Soviet Egyptian arms agreement between 1971 and 1973 did not include ZSU-23-4, suggesting that this number was already owned by the Egyptians in 1971. Additional weapons owned and manned by the Soviets were also deployed in Egypt in 1971. The Soviets insisted on taking their SAM-6 brigade, 18 ZSU-23-4s and 48 SAM-7 launchers, among other equipment, upon leaving Egypt in 1972. See Shazly, (1980), pp. 162-164. On Dupuy's estimate, see Dupuy, (1978), p. 698.


94. Sadat devoted almost three sections of his book to describing

95. Although the Chinese government offered to provide Egypt with small arms after the 1967 War, Nasser refused the offer. Farid, (1979), p. 32.


97. According to Heikal, who accompanied Nasser in his visit in January 1970, Nasser told the Soviet leaders that, 'I shall go back to Egypt and I shall tell the people the truth. I shall tell them the time has come for me to step down and hand over to a pro-American President. If I cannot save them, somebody else will have to do it. That is my final word.' Heikal, (1975), p. 87.


99. Sadat, p. 201. It is not known for sure what kind of treatment Nasser meant, but one can only infer from the context of Sadat's discussion, in which this story was told, that Soviet lack of response to Nasser's request is what Nasser was complaining about.


102. For Sadat's several descriptions, see Sadat, (1987), pp. 235-238.


104. Implied in Fawzi's book is that most Egyptian officers used to believe Egypt did not pay for the supplied Soviet weapons. Fawzi,

Egyptian strategic thinking changed significantly during the period 1967 to 1973, resulting in a shift towards a less ambitious and more realistic politico-military strategy. The Egyptian military command realized that the shortage of military resources and capabilities from which Egypt suffered would only allow it to wage a limited war. As used here and not in the superpower sense, the term 'limited war' applies to any local war where the combatants themselves decide, or have been persuaded by others, to observe some significant restrictions in their use of force. Such restrictions usually apply to at least one of the following aspects: the aims of the war, military means employed, geographical demarcation of the battle zone, targets attacked, and the like. (1)

Until the June 1967 War, the perception that there was a basic contradiction with Zionism and that conflict with it was inevitable dominated Arab military thinking and approaches to the Arab-Israeli conflict. According to these convictions, the military solution, involving a final decisive battle, was thought to be the only way to regain Palestinian rights. (2) After the 1967 defeat, these strategies needed to be revised, in particular because Presidents Nasser and Sadat were convinced that retaking occupied Egyptian land was a
necessity if they were to stay in power. Both Presidents also recognized that there would be no possibility of promoting a political solution in the absence of military initiatives: a military battle could be needed either to strengthen the Egyptian position in peace talks, or to replace them if they failed. (3)

The strategic order which President Sadat issued to General Ahmad Ismail Ali, the Egyptian Minister of War, on the eve of the October 1973 War included three objectives: (4)

First, to end the military lull by breaking the ceasefire on 6 October 1973.

Second, to inflict maximum possible losses on enemy personnel, weapons and equipment.

Third, to liberate the occupied territories in successive stages, according to the Armed Forces' capabilities. (5)

These objectives were based upon a previous political-strategic analysis sent by Sadat to General Ali, which was discussed at a meeting of the Armed Forces' Supreme Council (AFSC) on 1 October 1973. (6) According to this analysis, the essential argument was that launching a limited war would give needed impetus to the peace process. By placing Israel in a less advantageous position, a war would exert pressure on it to withdraw from the occupied Arab territories.

The main driving force behind the shift in overall politico-military strategy to a limited war approach was the reality of
Egyptian military capabilities in the air. This process of change took place from 1971 onwards and was resolved by the end of the following year. Inability to confront the Israeli Air Force in the sky imposed continued reliance on the ground-based air defence system that had evolved over 1967-1970. Accordingly, the Egyptians now turned to a limited ground operation to be launched under cover of their umbrella of SA missiles to compensate for their weakness in the air. Arriving at a limited war strategy was the result of a long, intensive debate and exhaustive thinking on the part of the Egyptian political-military command. Part of this process was the experience gained during the reconstruction of the Egyptian Armed Forces and the War of Attrition in 1967-1970, none of which was sufficient, however, to cause a fundamental change in Egyptian strategic thinking. The senior command also had to struggle to rid itself of long-held convictions and policies which affected military thinking. The internal debate was between traditionalist senior officers and more realistic and pragmatic ones, forming over time two distinct schools of thought. This division in opinion was initially vague, but views became more clearly polarized once the preparation of plans for the 1973 offensive had started in the second half of 1971.

The aim of this chapter is to argue that the principal reason for the change in Egyptian strategic thinking was the new reality of the Armed Forces' structure which Egypt had been driven to adopt during the 1967-1970 period. Accordingly, Egypt's lack of capability to fight the Israelis in the air and the consequences of that for the other arms were the most important factors responsible for the change.

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Seeds of Change

After the 1967 defeat, Nasser was forced to choose between conventional and people's war types of war against Israel - the latter depending on guerrilla tactics (hit-and-run raids). His adoption of the first option was based on the assumption that the flat and bare topography of Sinai did not favour unconventional wars, especially as Israel possessed an effective air force. The War of Attrition represented Nasser's use of a conventional strategy. (7) Regardless of the success or failure of this strategy and its results, Nasser's choice of a war of attrition at a time when Egypt was too weak to wage an all-out war marked a shift in Egyptian military practice and in strategic handling of the Israeli issue. The War of Attrition aimed both at imposing a higher price on Israel for keeping the occupied territories and bringing the Middle East crisis to the attention of world public opinion. A related development was the fact that for the first time declared Arab objectives were reduced, better to suit available resources: from complete elimination of the state of Israel to accepting it within its pre-1967 boundaries. This was indicated in Nasser's acceptance of United Nations Resolution 242 in 1967 and later of the peace initiative presented by US Secretary of State William Rogers that was to end the War of Attrition on 7 August 1970. The conclusion that a change in Egyptian strategic views was underway in that period is also supported by Egyptian military planning at the time. During the War of Attrition, the Egyptian military command started to draw up less ambitious plans reflecting the move away from the grander objective of total liberation of Palestine. By the end of
1970, there was in place a defensive plan code-named 'Operation 200' and a more aggressive one called 'Granite I'. But although Granite I incorporated raids into Sinai and crossing operations by larger units, 'it too fell far short of being a true offensive plan', according to then Chief of Staff, General Shazly. (8)

Despite the reality of this change in strategy, which was demonstrated first by the act of selecting an attritive war and then by its subsequent conduct, it was too early to bring about an impact on Egyptian military thinking. The objective of the Egyptian command was now to liberate Egyptian territories occupied in 1967, through military means. (9) Consequently, Egyptian military efforts at this stage were directed towards preparing for a full scale operation to regain Sinai and the Gaza Strip. (10) The series of command-level exercises code-named 'Liberation' which started in 1967 were characterized by their unrealistic goals. (11) They deliberately assumed that Egypt had more units and formations than it did in reality. In order for the exercises to proceed, the IAF was portrayed as having been neutralized, though to achieve this result the EAF and Air Defence were assumed already to have reached their future strengths, rather than the lower force levels they actually had. At this point, the Egyptian commanders viewed the War of Attrition as a phase which should be utilized to train forces and to build up morale. Many senior commanders objected to the name of 'War of Attrition', and argued that it was an active defence phase, which is usually followed by an offensive. (12)
General Fawzi, the Minister of War and the Commander-in-Chief of the Egyptian Armed Forces during the 1967-1971 period, neither acknowledges the change in the strategy of handling the conflict with Israel, nor admits the new reality of the Egyptian force structure that developed due to various factors during the period 1967-1970. He asserts that the plans 'Operation 200' and 'Granite 1', which were prepared during Nasser's lifetime, both aimed at liberating the whole of occupied Egyptian territories, including the Gaza Strip. (13) He states that these plans were tested successfully in an exercise in March 1971 that was umpired by Soviet advisers: it proved that a major Egyptian offensive lasting only 12 days could achieve the above-mentioned objectives. He argues, moreover, that an opportunity was lost in Spring 1971 for the Egyptians to launch such an offensive to retake all their occupied land. (14) Fawzi's claims and views were controversial, however, and were mostly met by denials and challenges, and led to bitter attacks on him by many of his colleagues and by defence analysts. For example, Marshal Gamasy, the head of operations in 1972-1973, asserts that no Egyptian offensive plans ever existed during Fawzi's command and that plans 'Operation 200' and 'Granite 1' were defensive ones. (15)

The Egyptian defence expert and author, Jamal Hammad raises several critical and fundamental points. (16) First, it was impossible to launch a crossing operation in 1971 along the whole length of the Suez Canal under cover of the SAM belt, at a time when that belt was providing cover to limited areas of the Canal only. This limitation was due to the shortage of SAM-3 batteries, ECM equipment and
maintenance workshops. Secondly, even if Egyptian field formations managed to cross the Canal, their ability to march forward over at least 45 kilometres of open terrain to seize the Sinai Passes, in the absence of effective air support by the EAF and given the limited range of the SAM umbrella, was extremely doubtful. Thirdly, the Egyptian divisions would be easy targets for the IAF as soon as they moved a few kilometres east of the Canal towards the Passes, unless they were accompanied by mobile armoured anti-aircraft weapons systems to provide cover against low-level attacking aircraft (weapons like the SAM-6 and the ZSU-23-4 only entered the Egyptian inventory after 1971).

The flaws and contradictions in General Fawzi's version concerning the ambition to launch a full-scale offensive for liberation indicate clearly that the traditional Arab military mentality was still strong at that time in the top level of command. The Egyptian Chief of Staff, General Sadek, held similar beliefs (which will be discussed later). Moreover, such outlooks had not been influenced by the actual changes in political and military strategic realities and by the evident imbalance in the main Egyptian arms.

Conflict over Change.

In May 1971, soon after Sadat was confirmed as President (in October 1970), he promoted General Sadek from Chief of Staff to Minister of War and Commander-in-Chief, and appointed General Shazly as the new Chief of Staff. General Sadek felt that Granite I was not
ambitious enough as an offensive plan, and therefore ordered his Chief of Staff to review it with the aim of launching an offensive that could liberate all the occupied Egyptian land, including the Gaza Strip (which had been under Egyptian responsibility before the 1967 War). (17) General Shazly started a comprehensive analysis and initiated comparative studies of Israeli and Egyptian military capabilities in the main arms: Air Force, Army, Air Defence and Navy. Upon the completion of these studies in July 1971, he concluded that, 'It [is] impossible for us to launch a large-scale offensive to destroy the enemy concentrations in Sinal or to force him to withdraw from Sinai and the Gaza Strip. All that our capability permit[s] [is] a limited attack. We could aim to cross the Canal, destroy the Bar-Lev line and then take up a defensive posture. Any further, more aggressive moves would then need different equipment, different training, a lot more preparation'. (18) Having arrived at this conclusion, General Shazly drew an outline of a limited operation to cross the Canal and then revert to a defensive posture within the range of the SAM umbrella. When this plan was submitted to General Sadek for endorsement, it was flatly rejected as being inadequate. Sadek maintained that an Egyptian offensive should be forceful and unlimited. (19)

Starting from July 1971, the fundamental difference in opinion between the Commander-in-Chief and his Chief of Staff surfaced, and an intensive debate broke out in the following AFSC meetings. Although the difference in views originated with these two men, each was evidently trying to gain support from other senior commanders, with
the result that two different schools of thought formed within the Egyptian military command. The first called for a shift in the way the Egyptians should fight a war towards adopting an offensive with limited objectives, while the second, representing the old classical thinking, called for total liberation.

However, after the discussions reached a stalemate, the Egyptian military command arrived at a compromise based on preparing two offensive plans simultaneously. (20) The first plan, code-named 'Operation 41' (changed to 'Granite 2' in 1972), envisaged marching 50 to 65 kilometres east of the Canal and the seizure of the Sinai Passes. (21) It was prepared in close co-operation with the Soviet advisers, both to gain their help in estimating the quantity of additional weapons and equipment required for implementation of this plan, and to win their support and influence inside Soviet military circles. (22) The second offensive plan, code-named 'Al-Maathen Al-Alia' (tall minarets), was based on available resources and capabilities, and aimed at establishing a bridgehead eight to ten kilometres east of the Canal. The latter plan was prepared in complete secrecy from the Soviet advisers. (23) Both plans were ready by the end of 1971. In essence, the two plans were identical in the way the Egyptians planned for the initial crossing and the establishment of a bridgehead east of the Canal, but 'Granite Two' included a second phase to seize the Passes, which was to be implemented immediately after the first phase. Later, however, Shazly claimed that the more ambitious plan (Granite Two) was used for a political reason; it was
shown to the Syrians early in 1973 to convince them to go to war alongside Egypt. (24)

Arriving at a compromise in planning did not settle this internal conflict; nevertheless, it was beneficial to both groups in order to gain time and rally support. This was especially so for President Sadat, whose position was not at this point clear although he appeared to support General Sadek, his Commander-in-Chief. (25) As General Shazly's ideas ran counter to popular sentiment, he needed time to convince the President and more members of the AFSC of their worth. If made public at that time, his ideas would not have found many sympathizers, as Egyptian public opinion was geared to expecting the long awaited battle for total liberation.

It is possible that there were other ideas or schools of thought among Egyptian officers in this period, but they were not prevalent or at least were not expressed at the decision-making level. In the political and psychological climate following the 1967 War, moreover, open discussion was not encouraged, and in any case the Egyptian Armed Forces at the time had no regular medium — such as internal seminars or publications — for conducting a debate. (26) It is difficult therefore, to determine what, if any, other opinions there were outside the Armed Forces Supreme Council, which was the senior decision-making body within the Armed Forces. Here, Sadek and Shazly dominated the debate and decision-making process, more especially as, in 1971, Sadat had only recently come to power and had not yet forcefully intervened in the discussion, despite leaning towards the
traditionalist approach. (27) Given the centralized, authoritarian nature of the Egyptian regime and the Army, and given the importance of personal loyalty to the President and C-in-C as a criterion for advancement, other senior officers were reluctant to offer alternative views, and so no other school of thought emerged at this level. (28) The existence of a second school was due only to the strong personality of Chief of Staff Shazly who had deeply-felt convictions about how Egypt should fight. (29)

Motives and Arguments.

Among the supporters of General Shazly in the AFSC were General Saad Mamoun, Commander of the 2nd Egyptian Army, General Fahmi, the Air Defence Commander, and General Gamaey, Head of Operations. The main argument advanced by this first school was that the realities of the Egyptian force structure dictated a strategy different from that of launching a full-scale offensive across Sinai. Changing the structure that had developed since 1967 to enable Egypt to liberate Sinai would require a long time. Consequently, if Egypt wanted to alter the status quo through a military initiative in the short term, it had to be through a limited operation.

As a result of the earlier reconstruction plan and the War of Attrition the Egyptians found themselves with huge land forces consisting of about 800,000 men, less than half of whom were in combat units. (30) The bulk manned a variety of paramilitary, support and rear area security formations. This imbalance was prompted by the Egyptian
fear that in any future conflict the Israelis would repeat the tactic of sending heli-borne raids deep into Egypt and across the Red Sea coastline. (31) In order to defend hundreds of isolated targets, especially the vulnerable irrigation system of Egypt, hundreds of thousands of men were diverted. As a result, the actual ground forces that the Egyptians could deploy in an assault across the Canal provided no more than parity with Israeli troops once fully mobilized. (32)

The Egyptian Naval arm was stronger than the Israeli, but weakness in the air neutralized it. (33) Egyptian ships were unable to challenge Israeli ones without being exposed to devastating air strikes. Even in port, the Egyptian Navy was vulnerable because of the lower priority accorded to it when allocating air defence assets. Evaluating the situation after 1967, the Egyptian command ceased developing and modernizing the Navy until they could provide air cover for it. (34)

By 1971, the Egyptian Air Force had not been able to remedy the problem of pilot shortages, which had led to the request for Soviet pilots who were flying at least 30 percent of Egyptian MiG-21s and all 50 Su-15 aircraft by 1970. (35) Upon the Soviet departure from Egypt in August 1972, the old problem of pilot shortage returned. Seeking to solve it, the Egyptian command requested experienced MiG-21 pilots from the Democratic Republic of Korea. A small mission consisting of about 20 pilots arrived in Egypt in June 1973 and fought during the 1973 War with the EAF. (36) Nevertheless, Israeli pilots remained superior in air combat over their Egyptian counterparts. This was
demonstrated in the few encounters which took place during that period, such as the downing of two Egyptian MiG-21s in an ambush on 13 June 1972. Superior Israeli tactics forced the EAF to avoid direct contact, and instead to patrol designated areas. In Shazly's words, 'No air-to-air combat was to be accepted at unfavourable odds'. (37) Conversely, the Egyptians were able to establish the 'SAM box' west of the Canal, providing air cover for the major concentration of ground forces, and to reinforce their air defence capability with more weapon systems. Most of these weapon systems were not mobile, however; moreover, at least 40 percent of Egyptian SAMs and most of the advanced electronic equipment were still operated by Soviet personnel at the end of 1971. (38)

According to General Shazly, four main motives pushed him to conclude that Egypt was able to launch only a limited operation: the weakness of the Air Force, SAM limitations, the need to avoid a war of movement, and the high chance of success in a limited action. (39) The pragmatic group calling for change judged that the Egyptian effort to build up military strength after 1967 had in fact ended with a weak air force, but an adequate static air defence. They considered that, in planning for an offensive, the main consideration should be to avoid committing the still-weak EAF against the IAF. Accordingly, they envisaged two main roles for the EAF. (40) First was to defend specified areas in close coordination with the Air Defence. Chases outside those areas were not to be allowed except as part of a tactical plan worked out beforehand. Second was to use the Air Force for sudden ground-attack strikes where enemy air cover was least.
likely. They also noted that Egyptian aircraft had short ranges and limited payloads restricting the weaponry and electronics they could carry, while Israeli aircraft were more sophisticated, being fitted with better missiles and far more advanced electronics. This first group warned that without cautious and careful planning, the Air Force would only be destroyed for the third time.

This pragmatic group also realized that without the means to counter enemy electronic warfare, the air defence would also be vulnerable. Moreover, while they admitted that the air defence system was approaching adequacy, they raised concern about SAM deficiencies. (41) The huge radars and electronic equipment of the SAM units were easy targets for enemy air strikes if spotted while on the move. For static defence, they might prove adequate if safely underground, but they could provide no air cover for an offensive operation, especially across the open landscape of Sinai. From the SAM sites 15 kilometres west of the Canal, it was impossible to provide cover for the ground forces if they marched more than a few kilometres east of the Canal. General Shazly calculated that the greatest depth of advance possible while remaining under the umbrella of the Canal-side SAMs was 'some six to eight miles' (about 10-13 kilometres). At that line, 'We would have to halt, entrench our troops and reorganize our air defences. To send ground forces rolling beyond that, without mobile SAMs to give advancing air cover would be to court disaster'. (42)
The pragmatic group judged that a limited operation (which involved crossing the Canal and consolidating the defensive positions 10-13 kilometres to the east) would also give the Egyptians the opportunity to inflict heavy losses on Israeli forces at minimum cost to themselves, as well as avoiding a fight with the Israelis on their terms (a war of movement). In their assessment, such a limited operation had a good chance of success, a success needed to restore the morale of armed forces beaten three times in 19 years. They argued that the offensive should be 'a calculated risk rather than a gamble'. (43)

In avoiding a war of movement, the pragmatic group's evaluation of Egyptian military capabilities was realistic. Although Egyptian ground forces increased in numbers during the 1967-1971 period and achieved superiority over the Israelis in infantry and artillery, they continued to suffer from a lack of mobility.

Despite Egyptian superiority in the total number of tanks, the Israelis had more armoured brigades. (44) This was due to the difference between the way the two countries organized their tank units. In accordance with their military strategy, which basically revolved around the aircraft/tank combination in mobile war (Blitzkrieg), the Israelis concentrated most of their tanks in armoured brigades, whereas the Egyptians distributed their tanks in a balanced manner to armoured, mechanized and infantry divisions. Based on the Egyptian concept of organizing combined arms teams, roughly one-half of their total tank force was distributed to mechanized and
infantry brigades and a number of independent tank battalions, leaving no more than half organized into 10 dedicated armoured brigades compared to 14 Israeli brigades. (45) 

Moreover, although the number of Egyptian mechanized brigades increased by 350 percent during the 1967-1971 period, this was accompanied by only a 100 percent increase in Armoured Personnel Carriers (APCs) during the same period. (46) Having fewer APCs than the Israelis to spread among a greater number of mechanized brigades, the Egyptian forces' mobility was far less than the Israelis. Furthermore, although Egyptian artillery in the 1967-1971 period increased from 1,000 to 2,000 pieces, which had the advantage in range, Israeli field guns were self-propelled which gave them similar mobility to the tanks and enabled them to redeploy and start operations in a short time. (47) Egyptian artillery, superior in numbers but of low mobility, could best be used in a defensive type of war; in a mobile war, towed Egyptian artillery would be less effective and vulnerable to ground and air attacks.

The fact that two thirds of the Egyptian ground forces were infantry - resulting from the availability of Egyptian human resources and the implementation of the conscript system in 1967 in particular - meant that the bulk of the forces lacked mobility and were, therefore, suitable only for slow and defensive operations. (48) Nevertheless, Egyptian superiority in infantry brought with it an advantage in anti-tank weapons as the infantry was equipped with light and medium Soviet anti-tank guided missiles (ATGM) to reinforce its defence.
capabilities. Of importance was the fact that as infantry is the essential element needed for a canal crossing operation, Egyptian superiority in this domain would be exploited at the beginning of an offensive across Sinai.

Opposing the limited war concept was the tradition-minded group headed by the Minister of War and Commander-in-Chief, General Sadek, and supported by senior officers (among them in the AFSC, for example, were General Abdul Khabir, Commander of the Central District, General Abdul-Qader Hassan, deputy Minister of War, and General Mohrez, Head of Military Intelligence). They rejected the idea of launching a crossing operation and turning to defence on the other side of the Canal, for a variety of reasons. Politically, their judgment was that a crossing operation of this kind would achieve nothing; it would not suffice to force Israel to withdraw from the occupied territories because Sinai would remain under their control. (49) Militarily, they argued that such an operation would create more problems for Egypt than for Israel. The present Egyptian defensive positions were protected by the Canal, a formidable obstacle to enemy assaults or raids. Changing Egyptian defences to the east side of the Canal would, in their view, not only deny them the Canal as a barrier but would also put the forces in an extremely dangerous situation if the Israeli counter attacks succeeded in pushing back Egyptian forces. Moreover, such an operation would also create fragile lines of communication over the Canal bridges. (50) General Sadek was convinced that if Egypt eventually decided to launch an offensive it should be a full-scale
one. According to Shazly, Sadek wanted 'A clean, swift sweep through Sinai and the Gaza Strip to destroy the enemy concentrations'. (51)

The traditionalists believed that a full-scale offensive, which must include at least the capture of the Sinai Passes in its first stage, would be of significant political value. From the military point of view, they thought that securing the Passes quickly would put Egyptian Forces in a strong offensive and defensive position. More important, this would also enable Egypt to activate forward air bases in the Canal zone, thus extending the reach of the EAF. Their perception was that achieving this in the opening stage of an Egyptian offensive would enable Egypt to sustain the cost of the expected Israeli deep raids. Conversely, this would force Israel to amass forces in the open desert in anticipation of a further Egyptian march, or in trying to block it once started. Their estimation was that Israel would not have sufficient forces to meet this challenge, particularly if this Egyptian action was synchronized with simultaneous Syrian and Jordanian attacks on Israel. They judged that the Israeli economy could not sustain operations of this size for a long period of time, which would lead, therefore, to an eventual change in Israel's political stand. (52)

The main argument of the tradition-oriented group was that the Egyptian offensive should have the objective of liberating the whole of Sinai and the Gaza Strip, and not merely of crossing the Canal. Admitting the weaknesses and limitations of Egyptian forces and the difficulty of accomplishing such a task, they insisted on waiting
until Egypt had acquired the needed weaponry and corrected deficiencies before launching a major offensive. General Sadek argued at the AFSC meeting of 8 July 1971 that it was more important for Egypt to define the optimum possible goal and concentrate on gaining the means to achieve it, than to launch a risky limited operation. (53)

The main difference in views between the two groups was thus over whether to wait until the deficiencies had been remedied, or whether to utilize available resources for an immediate offensive. The pragmatic group argued that as long as Egypt could neither guarantee that it would get the necessary military means nor exert pressure on the Soviet Union (its main source of weaponry), it had to act within the means it could reasonably expect to possess. (54) Nevertheless, this group's evaluation was that Egypt's problem did not stem from the lack of new weapons, but rather from Israeli superiority in fighting capabilities. Egypt had done all it could to mobilize its resources for war, and its ability to absorb new arms (particularly in the air) had reached the maximum limit. In this context, General Shazly argued in one AFSC meeting that, 'The enemy has the capacity to absorb new types of aircraft faster than we can. So he will always be able at least to maintain the present gap and probably widen it'. (55) Consequently, the pragmatists believed that a rapid solution to Egypt's problems was unlikely and that it would have to wait for a long time before its force structure became adequate for a 'total liberation' offensive. (56)
The traditionalists maintained that Egypt could not afford to lose any more battles, and it was therefore best for Egypt to wait until it had achieved strategic superiority over Israel, mainly in the air. Once attained, this would enable it to direct a single final blow at Israeli forces and liberate the whole of the Egyptian territories. At the AFSC meeting of 2 January 1972, which was attended by President Sadat, General Sadek concluded that although the Egyptian Armed Forces were willing to fight, they should not decide on war unless victory was guaranteed. He added that deficiencies should be remedied before going into battle. (57) The tradition-minded group also expressed their deep concern about the high rate of Egyptian casualties expected in the present situation of the Armed Forces, if Egypt decided on war and attempted a crossing operation. (58)

Taking the failure to improve the position of the Egyptian Air Force as an example, General Sadek and his supporters blamed the Soviet Union for its lack of commitment to Egypt. In doing so, they exaggerated the importance of having Soviet Tu-16 heavy bombers, which were referred to as 'deterrent aircraft', as a precondition for launching a major offensive. (59) General Sadek started to criticize the Soviet Union publicly from the beginning of 1972. In March the same year, he wrote a letter to his Soviet counterpart suggesting the withdrawal of the crews of 18 out of the 27 SAM-3 batteries operated by Soviet personnel in Egypt, as Egyptian crews were now ready to replace them. Although he acted according to a previous agreement which gave Egypt the right to request an end to the services of Soviet troops once Egyptians were ready to replace them, it seems that the
USSR interpreted this as a hostile gesture on the part of Sadek, especially as his request came two months before the American-Soviet summit meeting due in Moscow at which the Soviets were keen to appear on an equal footing with the Americans in Middle East affairs. (60)

These incidents not only exacerbated deteriorating Soviet-Egyptian relations, but also invited Soviet accusations that General Sadek was leading an anti-Soviet campaign inside the Egyptian Armed Forces. (61) Soviet complaints against Sadek may have been perceived by many Egyptians, including the President, as indicating Sadek's increased involvement in politics. (62) In any case, losing faith in Soviet willingness to provide Egypt with better and heavier aircraft, General Sadek suggested to the President that Egypt should try to purchase weapons systems from western countries. (63) Egypt's efforts to purchase western weapons before 1973 were, however, limited to initial contacts with Britain. Both Mahmoud Riad, Egypt's Foreign Minister in 1972, and Sadat's National Security adviser, Hafez Ismail, assert that they raised the issue of Egyptian interest in purchasing Anglo-French strike fighter in two separate meetings with the British Prime Minister, but with no success. (64)

In conclusion, both sides of the debate within top Armed Forces circles agreed that the present Egyptian force structure suffered from serious imbalances and shortcomings. Specifically, the weakness of the Air Force and the limitations of the huge air defence force were facts that had to be considered when planning for an Egyptian offensive. The first school of thought envisaged a limited operation in which Egypt
would avoid committing its Air Force and utilize the cover provided by its air defence, while the second school (the traditionalists) was sceptical about the value of such an operation and called instead for improving the forces' capabilities before embarking on an offensive, which in any case should be a full-scale one. Significantly, however, the report of the head of the General Intelligence Service, General Ismail Ali, which was discussed in an AFSC meeting in June 1972 emphasized the air dimension in preparing for an Egyptian offensive. Its conclusion was that the enemy's superiority, especially in the air was such that Egypt's Armed Forces were in no position to mount a successful assault. (65)

Sadat: The Supreme Commander.

Since coming to power in October 1970, Sadat's attitude and action had been inconsistent. At first, he announced that Egypt would start operations immediately after the expiry date of the 1970 ceasefire. (66) A few months later, in February 1971, he justified extending the ceasefire, and rejected the renewal of the War of Attrition as being too costly for Egypt. (67) Implied was an objection to the concept of an attrition war in favour of preparing for a war of total liberation of the occupied Egyptian territories. Sadat appeared to support, at least, the more modest goals of the 'Granite 2' offensive plan which aimed at reaching the Sinai Passes, the most ambitious plan Egypt had at the time. In line with his exaggerated expectations, he announced, on 23 July 1971, that Egypt would not allow the year to end without finding a solution, whether peacefully
or by war, to the 'battle of survival', even if the cost to Egypt was one million dead. Egypt would not accept the 'no war no peace' situation. (68) On 26 July 1971, Sadat explained that the 'year of decision' meant that the way to victory would be clear for the elimination of the results of Israeli aggression. (69)

It seems that the President, and his Commander-in-Chief, General Sadek, had the same ideas concerning Egyptian military strategy at this stage: specifically, that Egypt should not repeat an attrition war but instead should acquire the needed weapons and equipment for launching a final and decisive offensive. The President was, however, aware of the weakness of the Air Force and the air defence. In explaining his decision not to renew the War of Attrition, Sadat said, 'How can I enter a war of attrition while the Upper Nile is unprotected?'. (70) Expressing his concern about the problem of the pilot shortage during a meeting with his military commanders on 11 May 1971, he stated that he would 'sleep comfortably only when [Egypt] has a thousand pilots'. (71) Supporting the demands of his top military commanders, Sadat used his meeting with the Soviet leadership in Moscow on 1 March 1971 to urge them to fulfil their previous promises to send Tu-16s to Egypt. (72) The USSR insisted on placing these aircraft under Soviet command, however, a condition refused by President Sadat, with the result that this demand was not met. (73)

Upon the preparation of the two Egyptian offensive plans previously mentioned, Sadat and Sadek flew to Moscow in October 1971 to sign the most extensive arms agreement possible in order to improve Egyptian
offensive capabilities. Among the many items, this agreement included 10 TU-16 heavy bombers, 100 MiG-21FM2s (50 to be delivered before the end of the year), 20 MiG-23s (to be delivered in 1972), a SAM-6 brigade, two artillery battalions and three PMP heavy bridges, in addition to other assistance to help the Egyptians in manufacturing ammunition of various calibres. (74)

Towards the end of 1971, external factors interfered with Sadat's ambitions. The promised weapons did not arrive, and the hope of turning 1971 into 'a year of decision' came to an end when the Indo-Pakistan War broke out in December. (75) This further increased tension in Soviet-Egyptian relations due to the behaviour of the USSR, which transferred a number of MiG-21s and SAM units from Egypt to India. (76) The Indo-Pakistan War offered the Egyptian command an opportunity to compare Soviet behaviour: supporting India with enough weapons to achieve its war aims on the one hand, and reluctance to provide Egypt with offensive weapons on the other hand. In addition, the Egyptian command bitterly resented the transfer of weapons from Egyptian inventories to India, and perceived it as an attrition of their military capability at the very time when they were planning to launch an offensive. (77) In consequence, the Egyptian command found a way to circumvent Sadat's commitment to launch an offensive during 1971, by blaming the Soviet Union. (78) This attitude was actively promoted by General Sadek and his supporters in the Army, who already displayed negative attitudes towards the Soviet Union.
Sadat's visits to Moscow in February and March 1972 did little to repair the damage in relations with the Soviet Union. On the contrary, the delay in sending agreed-upon arms shipments and the refusal to provide Egypt with the latest Soviet fighter aircraft increased the rift between the two countries. (79) According to Sadat, the Soviet-American summit meeting held in Moscow in May 1972 convinced him that the superpowers had agreed to suspend the Middle East issue. This was a major cause of his decision to end the service of Soviet military personnel in Egypt, as announced on 6 July 1972. At the same time Sadat asked General Sadek to prepare the Armed Forces to launch military operations any time after 15 November 1972. (80)

The second half of 1972 marked the final shift in Sadat's concept of the battle. The same dilemmas that had forced Nasser to start the War of Attrition had since increased, and exerted even greater pressure on Sadat. Egyptian debts were growing, internal instability was worse, and the frustration of the young was increasing. (81) In a meeting with the National Security Council on 30 September 1973, Sadat explained the motives for waging war and warned that if the situation of 'no peace no war' lasted much longer, it would only mean the collapse of Egypt within two years at most. (82)

At this point, faced with a resort to military action as the only means to resolve the Middle East conflict, Sadat started to be convinced that the ideas of Shazly's group concerning limited war were more realistic and practical. Three factors reinforced the change of Sadat's concept of war. First, the report by the head of the General
Intelligence Service, General Ismail Ali (whom Sadat trusted) supported the pragmatists' evaluation of Egyptian military capabilities, with its special emphasis on air inferiority. Second, the idea of waiting for the Soviets to provide offensive weapons had come to worry the President, especially after being told by senior officers that the long-awaited Tu-16s were of less operational value than originally thought. During a meeting at Inshas air base on 19 November 1971, the EAF commander, General Baghdadi, told the President that the bombers were slow and therefore vulnerable, and that the subsonic speed of their long-range air-to-ground missiles would enable the enemy to intercept them before they reached their targets. Most important, he estimated that only 20 percent of these bombers could survive combat missions. (83) Third, Sadat started to suspect that the lists of needed weapons presented by the Commander-in-Chief were exaggerated in order to provide an excuse for not fighting at all. General Sadek's increased involvement in politics may also have fuelled Sadat's suspicion that his views were based on self-interested ambition. (84)

Improved relations with other Arab countries, which promised to send Egypt western fighter aircraft, may have encouraged Sadat to start a war without waiting for the Soviet Union. Saudi Arabia promised to send 20 British Lightning aircraft as a gift and Kuwait promised to send an additional squadron of Lightnings, while Libya volunteered all its Mirage-3s, on which Egyptian pilots with Libyan identity were already receiving training in France. (85) Naturally, sending experienced Egyptian pilots to the three countries for
training on those aircraft had a temporary negative effect on the Egyptian Air Force by exacerbating the existing pilot shortage. (86)

General Sadek maintained his opposition to the limited war concept, which Sadat had come to believe was sufficient to produce significant political results. The final, major confrontation between the two approaches came on 24 October 1972, when Sadat met the AFSC. (87) The President sketched the outline of his conception of the war and explained that if it was possible to gain 10 kilometres of ground on the east bank of the Suez, this would enormously strengthen his subsequent diplomatic and political position, both internationally and within Arab ranks. General Sadek and his supporters objected to this perception and responded that it was extremely dangerous for Egypt to launch an offensive too soon. The General argued that the Israeli threat was still strong and that Israel was capable of raiding the interior of Egypt. General Abdul Khabir added that the Armed Forces' capabilities were being degraded because of Soviet arms supply policies. He also noted that the EAF remained weak and that its expected losses were a crucial factor to be considered. (88) More opposition came from General Wasel, the 3rd Army Commander, who pointed out that the rampart on the east bank of the Canal was higher than the one on the Egyptian side, and so attempting to cross the Canal would lead to high casualties among Egyptian forces. (89) In general most of those who spoke in that meeting expressed similar views to those of Sadek: Egypt could not start a war now or in the near future.
President Sadat concluded that historic meeting, however, by saying, 'We will simply have to use our talents and our planning to compensate for our lack of some kinds of equipment'. (90) Two days later, Sadat dismissed General Sadek and the Generals who were sceptical about his limited war concept. (91) In his autobiography, the President does not refer to the dispute over war strategy with General Sadek, and justifies his dismissal by asserting that 'He never wanted to fight, because he feared that a real war would take place'. (92)

Sadat's change of position from supporting the total war concept to launching a limited operation seems to have been more circumstantial than as a direct result of the pragmatists' arguments. Apart from his domestic pressures, his relations with the USSR deteriorated to the point of ending the services of the Soviet advisers in the summer of 1972, and at the same time, American reactions to his efforts to improve relations were not encouraging. Sadat's evaluation was that the Americans would not be interested in finding a political solution to the Arab-Israeli conflict unless there was a change in the status quo. (93) In his mind, Egyptian success in crossing to the other side of the Canal would be enough to create that American interest without the need to risk more by confronting the Israelis on a wider scale. (94) In this respect, Sadat himself could be classified as a pragmatist ready to adjust ends to means. Until this shift the relative strength of the two schools within the military command had been in the traditionalists' favour. But Sadat's argument on behalf of the concept of limited war, at the decisive meeting of 24 October 1972, represented a turning point in the relative strength of the two
schools and encouraged undecided senior officers to support the pragmatists.

Later, however, a wide range of views was expressed in explaining Sadek and his supporters' behaviour. (95) One Egyptian analyst explained the behaviour of the traditionalist group as resulting from the accumulated experience of Egyptian officers in previous wars: they had developed a psychological sense of apprehension about taking the decision to go to war. (96) Despite the interesting aspects of this view, this sense of apprehension was also noticeable in the behaviour and arguments of the group calling for change. Subsequently, however, it was proved that the views of the traditionalist group were widely shared inside the Armed Forces. This was indicated in the increased criticism of the President by junior officers and the dismissal of large numbers of senior officers. Of more significance was the discovery of a secret organization inside the Armed Forces a month later, operating under the name of 'salvation of Egypt'. Its members believed that certain forces - both internal and external - were trying to push Egypt into a war for which it was unprepared and which would lead to the destruction of the Egyptian Armed Forces. Members of this organization among senior Army officers were accused of conspiring against the regime. (97) Such sentiment notwithstanding, the Sadek group appears to have under-estimated both the pressure on the President to act militarily, and the political value of a limited operation.

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The significance of the meeting of 24 October 1972, however, was that it marked the final decision of the Egyptian political and military command to shift from the total liberation offensive to a limited one. President Sadat appointed a new military command which was committed to the latter strategy. General Ahmad Ismail Ali was appointed as Minister of War and Commander-in-Chief, with General Shazly remaining Chief of Staff, and General Gamasy was appointed Head of Operations. This new command was convinced that the 'Granite 2' plan was impossible to implement for lack of resources, instead, it focussed on the limited operation plan 'Tall Minarets', which was indeed implemented in October 1973.

This decision resolved the long-standing debate between an approach emphasizing the Air Force and the other stressing Air Defence. During 1971-72, both services had continued to receive new weapons and to upgrade their capabilities, but the latter remained dominant - in terms of size, weaponry and combat role - due to the previous emphasis on air defence in 1967-1970. The October 1972 decision, therefore, confirmed an existing situation, and the battle plan approved reflected existing Egyptian capabilities. Between the middle of 1972 and October 1973, the number of SAM batteries increased by between 22 and 30 percent. (98) More significantly, this included 20 SAM-6 batteries for the first time, as well as an additional eight batteries of SAM-3. (99)

In contrast, the Air Force acquired only 45 new combat aircraft between 1972 and 1973, among which were 20 MiG-21s and 10 Su-7s. (100)
The 100 MiG-21s included in the arms agreement of October 1971 seem to have had little effect on the overall strength of the EAF, either because delivery was not complete by September 1973 and/or because pilot shortages led to their being placed in storage. (101) A squadron of MiG-23s, agreed on in March 1973, arrived too late to take part in the 1973 War. (102) And, reflecting the shift in strategic emphasis, the Egyptians cancelled their earlier request for Tu-22 bombers. (103) Finally, although the strength of the EAF during the 1971-1973 period actually declined due to aircraft retirement, the problem of pilot shortage remained. (104) That the Egyptian pool of pilots was not increased is indicated by the fact that when the Soviet MiG pilots left Egypt in 1972, the Egyptians requested Korean pilots. Furthermore, in addition to the difficulties in training new pilots to reach operational standard, some experienced pilots were sent for training on different types in other countries which was of little use because Egypt did not get any of the promised aircraft except for a squadron of Libyan Mirage. This also suggests that in addition to the EAF failure to produce pilots according to their plans, the number of pilots leaving the system was considerable. The Egyptian failure to achieve a pilot to aircraft ratio of 1:1 even by 1973 invites speculation that the Egyptians lost more pilots during the War of Attrition than publicly admitted.

Conclusion

The imbalance in their Forces' structure that was a result of the reconstruction period in 1967-1970 compelled the Egyptians to revise
their military strategy against Israel. The weakness of the Egyptian Air Force, coupled with the adequacy of the static ground-based air defence, were dominant factors in shaping the new concept. However, the process of change from old beliefs did not take place without intensive debate. Both sides recognized the new imbalance in Egyptian forces but disagreed on the options available to them. Sadat, as Supreme Commander and under pressure to resort to the military option, supported the change in military strategy instead of waiting a longer time to address the problem of imbalance. This new strategy was tailored to rely primarily on ground-based air defence in launching a crossing operation (the air defence strategy).
References

1. Although the term 'limited war' originally referred to military conflicts between the superpowers short of total confrontation, in the nuclear age, a limited war from the point of view of the superpowers may not be limited from the point of view of the smaller countries. For a survey of definitions of limited war, see Siman-Tov, (1980), pp. 5-7.


3. Nasser frequently repeated that despite diplomatic efforts to resolve the Middle East conflict, an armed battle was inevitable. See for example, Riad, (1985), pp. 168-229, and Farid, (1979), p. 119. Interestingly enough, Sadat interpreted Kissinger's statement, that American ability to exert pressure on Israel towards accepting peace initiatives depended upon tangible changes in the Arab position, as meaning that Egypt should wage a limited war for that change to happen as a prerequisite for the American pressure on Israel. For more details on this view, see Ismail, (1987), pp. 258-265.


5. Implied in the term 'Egyptian Occupied Territories' was, besides Sinai, the Gaza Strip, which had been under Egyptian responsibility before the 1967 War. Nasser made this point clear in his address to the Arab Summit of Al-Khartoum on 31 August 1967. See Farid, (1979), pp. 91-92.

7. The question of what kind of war was suitable for Egypt after the 1967 defeat was openly discussed in the press. See, for example, Lutfi Al-Kholy, 'Who is the enemy', *Al-Ahram*, 7 September 1967. Heikal, a confidante of Nasser, compared different fighting theories and models and concluded that conventional war was the best for Egypt based on the enemy, topography, the economic level of growth and the combatants' own circumstances and objectives. See Heikal, 'The Way to Fight', *Al-Ahram*, 15 September 1967.


10. The Gaza Strip war was included in Egyptian offensive plan '200' which aimed at arriving at the pre-1967 War international borders. See Fawzi, (1984), p. 366


12. This view was expressed by many Egyptian senior officers among whom, for example, were General Ali Fahmi, the Air Defence Commander during the War of Attrition and General Imam, the Commandant of the Egyptian War College. In interviews, Cairo, 24 and 21 August 1988.


22. Rt. General Talat Musallam, Cairo, 18 August 1988. The General also revealed that Nasser organized a pressure group among Egyptian officers, of which Musallam was a member. Their task was to establish a good rapport with Soviet advisers and persuade them that the present level of Soviet arms shipments was far below what Egypt really needed.
25. Sadat's refusal to renew the War of Attrition and his insistence on acquiring long-range heavy bombers from the Soviets as a prerequisite for launching a war, this having been Sadek's basic demand, were indications of Sadat's support of Sadek's views at this stage. See Sadat, (1978), pp. 232, 238-239.
26. The presence of Soviet advisers at all levels in the Egyptian Armed Forces may have assisted in preventing Egyptian officers from expressing their views as they felt that these would not be heard by their superiors if different from the advisers' view. In an interview with General Musallam, Cairo, 18 August 1988.
27. Sadat's leaning to the traditionalist approach was evidenced in his resistance to the ideas of launching limited operations based on the attrition concept at this time. See, for example, Sadat, (1978), p. 232; Fawzi, (1986), p. 178.
28. Studies of the Egyptian decision-making process, by both Egyptian and non-Egyptians, confirm the authoritarian nature of this process. See, for example, Dawisha, (1976), p.104. For an Egyptian study, see Zahran, (1987), p.377.

29. Heikal best described General Shazly by saying: 'Shazly was quite a different character: his stocky, handsome figure contrasted with Ismail's bulk. Shazly was dashing; he could socialize, talk well, impress people - after tours as a military attache in London and then at the United Nations, Shazly was 'mondain' in a way that few Arab Generals are. He was a paratrooper - one of the first generals from that branch in the Egyptian Army - and he jumped until very recently, which of course added to his allure'. Ismail, the person Heikal compared Shazly with, is Marshal Ahmad Ismail Ali, the Egyptian C-in-C during the 1973 War. Heikal, (1975), p.182. The distinctive nature of Shazly's personality was also demonstrated even later, in other situations such as his opposition to the President and the C-in-C with regard to Egyptian military policy against the Israeli breakthrough at Diversoir in the 1973 War, and his disapproval of President Sadat's visit to Israel in 1977 which led to his resignation from his job (he was at that time the Egyptian Ambassador in Portugal).

30. Nasser frequently repeated in his speeches and meetings during 1969-1970 that Egypt had more than half a million personnel under arms and it was planning to arrive at one million; see, for example, Farid, (1979), pp.180-211. Nonetheless, Shazly states that when he was appointed as Chief of Staff in 1971, the total Armed Forces were about 800,000, only half of which were field troops. This seems consistent with the IISS estimate of the Egyptian Armed Forces strength in 1972.
32. For example, on the eve of the October 1973 War, Egypt had 10 armoured brigades, nine mechanized infantry brigades, 19 infantry brigades and four paratrooper brigades, while Israel had 18, nine, nine and five respectively. Azmi, (1984), p. 232.
33. For the Naval strengths of both Egypt and Israel, see The Military Balance, 1971-1972, pp. 29, 32.
34. Fawzi confirmed that the Egyptian reconstruction plan after 1967 did not include adding any units to the Navy but gave no explanation, while Shazly stated that Egypt's inability to provide air cover was the main reason for the decision not to modernize the Egyptian Navy. Fawzi, (1984), p. 231; Shazly, (1980), p. 23.
35. The IISS estimated that Egypt had about 200 MiG-21s during the years 1971-1973, and in addition there were 150 MiG-21s flown by Soviet pilots, while the Egyptians revealed that there were 95 Soviet MiG-21 and 50 Soviet Su-9 pilots (Fawzi was referring to the Su-15 interceptors). As these 100 additional MiGs were owned by Egypt, the percentage of Soviet-flown MiG-21s would be about 30 per cent. The Military Balance, 1971-1972, p. 32; The Military Balance, 1972-1973, p. 30; The Military Balance, 1973-1974, p. 31. See also Fawzi, (1984), pp. 318, 351; Azmi, (1984), p. 108.
37. Ibid., p. 59.
40. Ibid.
43. Ibid.
45. Those 10 armoured brigades were not even used on masse during the October 1973 War; rather they were distributed to support infantry divisions. On this point, see Fawzi, (1988), pp. 65-72.
46. During the 1967-1971 period, the number of Egyptian APCs increased from 1,000 to 2,000, with the mechanized brigades increasing from two to nine. Safran, (1969), pp. 441-443; O'Ballance, (1972), pp. 43-46, 90-91, 112-113, 226-227; Azmi, (1984), pp. 230-231.
48. In 1971, the strength of the Egyptian infantry forces (including airborne troops) was 42 brigades and 40 ranger battalions - effectively equivalent to 55 brigades - and represented about 65 percent of the total ground forces.
50. For the traditionalists' military point of view, see Riad, (1985), p. 385.

51. Although this comment was made by an opponent of Sadek, it is credible because its thrust was confirmed by Mahmoud Riad, Egypt's Foreign Minister at the time, who was himself a traditionalist. It is also consistent with Sadek's view on how Egypt should fight. Shazly, (1980), p. 27.


53. On this, see, for example, Heikal, (1975), p. 180; also Riad, (1985), pp. 385-386.

54. These views were expressed by Marshal Gamasy and General Musallam, both of whom were supporters of change in Egyptian strategy. Interviews, Cairo, 17 and 18 August 1988.


56. For example, General Musallam thought that if Egypt had to wait till it achieved strategic superiority in all aspects, that would mean waiting for ever. Interview, Cairo, 18 August.

57. In an interview with Marshal Gamasy, Cairo, 17 August 1988.

58. The number of Egyptian casualties in the initial stage of the crossing operation was estimated by Egyptian military commanders as 20,000 personnel. Riad, (1985), p. 446. See also, Sadat, (1978), p. 248.

59. Commenting on Soviet-Egyptian arguments about arms supply and Egyptian insistence on bomber aircraft Heikal wrote, 'As far as aircraft went, Egypt was so obsessed with Israel's successful pre-emptive strike of 5 June 1967 that to begin with all thoughts were concentrated on how to achieve the degree of air superiority that would enable Egypt in its turn to neutralize Israeli bases. Egyptian
planning was complicated by a mixture of frustration and hope, as the projected attack was put off while the planning for it ground on - we were impatient'. Heikal, (1975), pp. 167-168.

60. For more details on these two events which caused more problems for Soviet-Egyptian relations, see Hammad, (1988), pp. 237-240; also Heikal, (1975), pp. 161-162.


64. Hafez Ismail states that, in his meeting with Edward Heath on 21 February 1973, he felt that Britain was not ready to consider the Egyptian request to buy Anglo-French Jaguar aircraft, while Zayat stated this but did not remember what type of aircraft was involved. Ismail, (1987), p. 247. Also in an interview with Dr. Zayat, Cairo, 17 August 1988.

65. Shazly, (1980), p. 109. A few months earlier, however, General Ismail produced a report suggesting that Egypt should start a war of attrition in support of its political activity. Mahmoud Riad asserts that he discussed this report with both Generals Ali and Sadek, the latter objecting strongly to this conclusion. The significance of this is that General Ali believed that Egypt's military capabilities would not allow more than this type of war. Riad, (1985), p. 386.

66. Fawzi cited Sadat's addresses to the Armed Forces' officers on 17 and 18 October 1970 and on 30 November 1970, confirming that Egypt would fight if the ceasefire ended with no political progress. In his public speeches at this period, however, Sadat was deliberately vague.
about this point by giving the impression that Egypt would fight without actually committing himself. For example, in a meeting with the press on 3 January 1971, Sadat said, 'We will not allow the ceasefire to last unless there is serious effort for withdrawal according to the United Nations Security Council resolution, otherwise, we will not adhere to the ceasefire decision'. Fawzi, (1986), p.175; *Sadat's Speeches and Conversations*, p.52.


68. Jamal Hammad states that Sadat told Brezhnev on 1 February 1971, that Egypt was preparing to launch a limited offensive with the aim of capturing the Sinai Passes. This objective was that of the 'Granite 2' plan. Hammad, (1988), p.15; *Sadat's Speeches and Conversations*, pp. 281-282.


72. For the story of these Tu-16 heavy bombers, see Sadat, (1978), pp.233-234; also Fawzi, (1986), p.152.


83. This view was also expressed by other EAF pilots during Sadat's visit to Aswan on January 1972. Hammad, (1988), pp. 234-235; Shazly, (1980), p. 80.
84. For differences of view between Sadat and Sadek on these points and Sadat's suspicion of Sadek, see Heikal, (1975), p.180; also Ismail, (1987), p.233.
86. Although Egyptian pilots completed a conversion course on Lightning, held in Saudi Arabia by British instructors, neither the Saudi nor the Kuwaiti aircraft ever arrived in Egypt. Heikal, (1975), p.158.
87. All sources but Sadat agree that the decisive meeting of the AFSC in Sadat's residence in Giza took place on 24 October 1972, while Sadat wrote that it took place on 28 October 1972.
88. For more details of the discussions in this meeting, see Heikal, (1975), p.181; also Shazly, (1980), pp.117-123.
91. In addition to General Sadek, the Deputy Minister of War, General Abdul-Qader Hassan, the Commander of the Central Military District, General Abdul-Khabir, the Commander of the Navy, General Mahmoud Fahmi, and the Director of Intelligence were all dismissed. Heikal, (1975), p. 181.
93. On Sadat's diplomatic efforts to establish communications with the American administration, see Riad, (1986), pp. 103-122. See also, the account of Sadat's special representative to the American administration. Ismail, (1987), pp. 247-281.
94. This is indicated in Sadat's repeated phrase: 'The success of the Egyptian Armed Forces in liberating one foot of Sinai would be enough to create a change in the political climate and to arrive at an acceptable political solution'. See, for example, Riad, (1986), p. 158.
95. These explanations range from political motives to personal fears.
96. In an interview with Sayed Yasseen, Director of Al-Ahram Strategic Centre, Cairo, 17 August 1988.


103. Ibid., p.108.

CHAPTER SEVEN

THE NEW EGYPTIAN STRATEGY IN PRACTICE

THE OCTOBER 1973 WAR

No recent regional war has so drawn the attention of both military professionals and academics, in their attempts to draw lessons and conclusions for future military doctrines, as has the 1973 Middle East War. Interest in this war stems not only from the fact that two completely different strategies were put to the test, reviving the old debate of defence versus offence, but also from the fact that the war was fought with 'state of the art' weapons, spurring controversy over the future role of traditional weapon systems (i.e. aircraft and tanks).

Although the literature on the 1973 War has covered a wide range of aspects and lessons, some issues are still a matter of disagreement, while others have not received adequate attention, and leave certain questions unanswered. Among these are the following:

1. Would an Israeli pre-emptive strike have been successful?
2. Was the Egyptian air defence defeated? And how effective were Israeli air attacks, ground attacks, ECM equipment and advanced stand-off weapons (supplied by the US) in defence suppression?
3. How effective were the different air defence elements?
4. What accounts for the similarities and differences between events on the Syrian and Egyptian fronts?
5. Finally, was there any alternative strategy for the Egyptians?
Should they have driven forward to the Sinai Passes earlier, or should they not have tried an inland push at all?

This chapter will address these issues in an attempt to determine where the truth lies, in order to arrive at a correct evaluation of the Egyptian air defence strategy. In doing so, however, a summary of the war's events is necessary. Then will follow a discussion of the above questions and of the impact of Egyptian air strategy in the 1973 War on other arms.

COURSE OF THE WAR: GENERAL

From the beginning of the 1973 War, it was clear that it would take a different course from the 1967 War. In 1967, the war started with an Israeli pre-emptive strike that destroyed the EAF (mostly on the ground). The Egyptian Army was, therefore, forced to fight in the Sinai Desert without air cover, and was defeated. In 1973, it was the Egyptians who struck first, in conjunction with the Syrians. Taken by surprise, Israel needed time to mobilize its forces. Facing attacks from two directions, the Israeli evaluation was that the Syrian attack posed the more urgent problem, since it directly threatened population centres. In contrast, delaying action was needed on the Egyptian front. (1)
The Syrian Front

The military objective of the Syrian forces was to re-occupy the Golan Heights, thereby controlling the routes along which any counter attacks would have to come. (2) Israeli defences behind the 1967 cease-fire lines consisted of tanks and infantry units supported by mines, anti-tank weapons and obstacles designed to block approaches, thereby forcing attacking forces into desired 'killing' grounds. Most important of these obstacles was an anti-tank ditch some 5 metres deep along most of the cease-fire line. Israeli defences enjoyed depth but relied on only two communication routes between the Golan and Israel proper. (3)

The attacking Syrian forces consisted of three mechanized infantry and two armoured divisions, with about 900-1200 tanks. (4) Facing them initially were one Israeli infantry and two armoured brigades, with 180 tanks. (5) The Syrian Air Force had over 300 combat aircraft, including 200 MiG-21, 30 Su-7, 80 MiG-17, and a few Il-28 light bombers. The main Syrian advantage was the ability to concentrate the air defence force - which included 30 battalions of SAM-2s, 3s, and 6s, and 27 anti-aircraft companies - along a narrow front in support of the attacking units. (6) These air defences took an early toll of the Israeli Air Force. For its part, the IAF consisted of about 500 combat aircraft, including 100 F-4s and 160 A-4s. (7) Unlike the Syrians or the Egyptians, the IAF had to operate on two fronts simultaneously.
The Syrian attack was launched at 1400 hours on 6 October 1973. The Israeli force manning the crucial observation post on Mount Hermon, which provided an excellent view of the Syrian approach routes, was taken by surprise and decimated in an attack from the rear by a heliborne assault. The three Syrian mechanized infantry divisions moved forward and then the two armoured divisions passed through them, attacking Israeli defences in groups of tanks and personnel carriers. The infantry moved towards the lower slopes of Mount Hermon, but failed to dislodge Israeli defences. Later that day, a Moroccan infantry brigade took over the peak of Mount Hermon to relieve the assaulting force.

Opposing the mass of Syrian infantry and armour, the Israeli forces lost heavily, particularly in tanks. In the course of the fighting they lost ground in the centre, but held the flanks. On the morning of 7 October, Syrian forces in the southernmost part of the Golan front arrived within sight of the Jordan River (parallel to their defence line before the 1967 War), but stopped there abruptly. In the north, the Syrian forces were not able to proceed beyond the 1967 cease-fire line. To help the Israeli regular forces on the Golan, on 7 October, the IAF moved to concentrated attacks on the Syrian ground forces. Despite the increased aircraft losses that day (estimated at about 30 aircraft), it seems that IAF attacks were effective in containing the Syrian attack.

As the Syrian forces attacked well prepared Israeli defensive positions, they lost heavily. They lost about 800 tanks to mines and
anti-tank fire from both the ground and the air. The attack soon lost its momentum and from this point on, the tide of the battle turned in Israel's favour, as Israeli reinforcement progressed. (10)

From 8 October onwards, Israel started to launch a series of fierce counter-attacks, pushing the Syrian forces back. At the same time, the IAF started a round of retaliatory raids on targets deep in Syria, including the Ministry of Defence in Damascus, an oil refinery, and a main power station. The Port and the oil terminal at Tartus, Port Banias, and Latakia were all bombed, too. (11) Despite the heavy losses of the IAF, especially in the early stages of the fighting, it enjoyed superiority in air-to-air engagements against Syrian and Iraqi aircraft (two Iraqi squadrons had joined the battle on 8 October). As the Israeli forces were reinforced by fresh troops, they succeeded in pushing back the Syrian forces to the 1967 lines on 10 October. The Israeli forces continued their pressure and by 11 October had forced the Syrians back to their main pre-war defensive positions. After 13 October, the Israelis felt secure enough to start shifting resources to the Sinai front. Before doing so, however, the Israelis attempted to break through the main Syrian defences. They attacked Sa'sa' with the aim of isolating Arab troops from the rear. Upon the failure of this attempt and with the exception of one short battle, the front now stabilized. On 22 October, the Israelis regained the peak of Mount Hermon in a fierce battle only hours before a cease-fire took effect. (12)
The Egyptian Front

The objective of the Egyptian forces in the 1973 War was to recover some of the Egyptian territories lost in 1967. Although the Egyptians had two plans as noted earlier, one to cross the Canal and to establish a bridgehead on the east bank, another including an advance to seize the Sinai Passes as a second phase, all that they intended to do was to carry out the first phase. In its planning, the Egyptian command emphasized the need to keep its forces under ground-based air defence cover. (13) As a result, the fighting was limited to the area of the initial crossing.

As discussed in the previous chapter, the Israeli defensive line on the east bank (Bar-Lev) was originally built for protection following the artillery exchanges after the 1967 War. This line consisted of deeply-dug strong points, with overhead protection of concrete, steel and sand. These strong points were surrounded by minefields and barbed wire. This defensive line was also supported by two Israeli-made obstacles: a sand rampart along the eastern bank of the Canal towering as high as 60 feet above the water level, and a system of pipes through which oil and chemicals could be sprayed onto the Canal and ignited, turning the surface of the water into an inferno. (14) The Bar-Lev line was manned by an infantry brigade supported by an armoured brigade, in addition to which there was another armoured brigade based 10-20 miles to the rear - for a grand total of 280 tanks. (15)
The Egyptian attack started with artillery and air strikes at 1400 hours on 6 October, coinciding with the Syrian attack. (16) The Egyptian attack across the Canal was a model operation, well planned and executed. Explosive charges, pre-positioned by Egyptian commandos on the eastern side of the Canal the night before, were detonated and the pipes used to spray the 'floating fire' were cut or blocked by commando groups. Water cannon tore holes in the high rampart on the east bank of the Canal to make approaches for ferrying and bridging. Small bridgeheads were established and Egyptian infantry poured through to attack Israeli defences. At the same time, diversionary attacks were made elsewhere - Egyptian commandos attacked oil installations at Abu-Rudeiss and Sharm El-Sheik further south. Commando attacks were also made on Israeli communications in the middle of Sinai. (17)

In their offensive, the Egyptians used five infantry divisions. They crossed on a wide front - one at each of the five crossing points: just south of Qantara, north of Ismailia, north of Deversoir, Shaloufa and south of Suez. Two armoured divisions later passed through these assault divisions. (18)

All but one of the strongholds in the north of the Bar-Lev line were overrun within the first few hours. Those further south were isolated and surrounded. Attacks with amphibious tanks were launched through gaps in the Israeli defensive line. Ten heavy bridges and over 30 ferries were employed to cross the Canal as men and equipment poured over to the other side. Israeli artillery directed fire on the
crossing points, but in turn was heavily engaged by an overwhelming mass of Egyptian artillery. (19) The IAF was called to attack the crossing points but took heavy losses from ground-based air defence weapons. (20) It soon became obvious that neither artillery nor air attacks were adequate to stop the Egyptians from crossing.

On 7 October, and within 24 hours of the start of the war, the five Egyptian assault divisions with about 500 tanks were established on the other side of the Canal occupying a bridgehead four to five miles in depth - a small, shallow space for such a large force. The Egyptian forces had a gap in the centre of the front, where the Bitter Lakes stretched for about 45 km between the 2nd and 3rd Egyptian Armies. (21)

Conscious of its experience in the 1967 War, the Egyptian military command was extremely careful not to move units outside the air defence cover. The Egyptians thought it better to wait for Israeli armour to run into Egyptian defences than for the latter to advance towards the Sinai Passes. The Egyptian advance could occur after air defence weapons had rolled forward. Israeli armoured forces launched themselves against the Egyptians but lost heavily, mainly to effective use of light anti-tank weapons by Egyptian infantry. In these attacks one battalion of the Israeli armoured brigade in Sinai was almost completely destroyed on 8 October, while a brigade in the Qantara area met a similar fate the following day. (22) Nonetheless, although the Israeli counter-attacks failed to push the Egyptian forces back, these offensive operations prevented the Egyptian bridgeheads from expanding even up to their planned size.
Sadat felt that the course of events was in Egypt's favour, so he decided to reduce Israeli pressure on his Syrian allies by developing the Egyptian attack. The Egyptian command decided to bring over two reserve armoured divisions still on the west bank of the Suez Canal. They crossed between 11 and 13 October in preparation for a major attack against the Sinai Passes, which was launched at 0530 on 14 October. In this battle Egyptian forces ventured outside their air defence cover. In the most significant engagements of the war, the Egyptians lost heavily in armour and were turned back. The attack was renewed the following day but with no success. These battles, in which several hundred tanks took part, caused Israel losses in tanks as well, but her fighter aircraft, outside the SAM umbrella, ranged over the battlefield effectively. From this point on, Egypt was on the defensive.

The United States started supplying Israel by air on 13 October in response to repeated Israeli requests and to evidence that the Soviets were supplying the Arabs (the Soviet air lift had started on 10 October). Meanwhile, the two superpowers were constantly in touch regarding the Middle East crisis.

Characteristically, the Israelis sought to cross the Canal and attack the SAM bases behind Egyptian lines, especially after the Egyptian reserve had crossed to the eastern bank. The success of this operation, after a period of uncertainty, altered the course of the war by putting Israel in a dominant military position in the Canal area.
The Israeli attack across the Canal was launched in the evening of 15 October, through the gap between the 2nd and 3rd Egyptian Armies. Three Israeli armoured brigades took part: one to launch a diversionary attack on the 2nd Army and hold the area north of the gap; one to hold the crossing area and protect the bridging operation; and the third to cross to the west. A fierce battle (at the so-called Chinese Farm) developed in the gap, when the Egyptians counter-attacked from two directions to cut off the Israeli bridgehead on 16 October. It was too late, however, to prevent the Israelis from establishing their hold. (26)

The small Israeli force that had crossed started to attack Egyptian SAM bases in the area, allowing the IAF to operate freely for the first time. An entire Israeli armoured brigade soon followed, and successfully resisted Egyptian counter-attacks on the west bank. Most Egyptian Armour was now on the wrong side of the Canal; this included Egypt's strategic reserve force (two armoured divisions). The Israelis were quick to exploit their success, pushing more armoured brigades onto the west bank. Part of the Israeli force moved north towards the main Ismailia-Cairo road, but the main thrust was to the south. By the first cease-fire on 22 October, the Israeli forces were established in a small area, threatening to cut off the 3rd Egyptian Army and Suez City. They had also destroyed or neutralized the Egyptian air defences in the area. Breaking the truce, however, the Israelis quickly expanded their control, arriving at the Port of Ras Al-Adabia (at the Gulf of Suez) by the second (and lasting) ceasefire at 0700 on 24 October. In this last operation, the Israelis cut the Suez-Cairo road.
Israeli forces now controlled 1500 square kilometres of the west bank of the Canal, and the Egyptian 3rd Army was in danger of being cut off entirely. (27) The urgency of the situation prompted President Sadat to request the Soviets and the US to send observers or troops to interpose between the Israelis and Egyptians west of the Suez Canal.

KEY ISSUES

An Israeli Pre-Emptive Strike

By morning on 6 October the Israeli military command was convinced that war would break out later that day. In a meeting at 0800, Prime Minister Meir rejected a request by the Chief of Staff, General Elazar, for a pre-emptive air strike. (28) Controversy has since raged over the likely military achievements of a pre-emptive air strike, had it been implemented. Some people suggest that an Israeli pre-emptive strike in 1973 could have succeeded. They argue that, had the IAF been permitted to pre-empt on 6 October 1973, the destruction of the Arab SAM sites could have been accomplished in a few hours for a very minimal aircraft loss. Ignoring the improvements in Arab air defences, one Israeli specialist estimates that 90 percent of the SAM sites could have been eliminated in a period of three to six hours, for the loss of under 10 aircraft. (29) I disagree with this view because it rests on the assumption that it was the restraining influence of the US that prevented a strike, rather than military considerations. It also draws its conclusions heavily from the experience of 1967 – especially the impact of the pre-emptive strike (minimizing the
duration and casualties of the war) - and so ignores the new realities that had emerged by 1973.

An Israeli pre-emptive strike on 6 October would probably have made little difference to the course of events. It would not have stopped the crossing, nor would it have minimized the duration of the war. Rather it could have spelt disaster for the IAF to fly en masse against Arab air bases and other targets, unaware of the effectiveness of air defences. Important as they were, therefore, political considerations were not the determining factor. Had the Israeli command been convinced that a pre-emptive strike would be of military value and that it would have a high chance of success, it would most likely have decided in its favour.

Nor is the comparison with the Six-Day War valid. In 1967, Israel had enough time to allow diplomatic efforts to run their course, during which it was mobilizing troops and preparing plans. As important is the fact that Nasser's last-minute backing down during the escalatory process in May 1967, and the Egyptian Armed Forces' poor preparation for war strongly indicated that Egypt had no intention of embarking on a total war. This was confirmed by a formal Egyptian message passed to the Israeli leadership through diplomatic channels on 25 May and 2 June 1967. (30) As a result, the relaxed Egyptian military posture offered the Israelis an excellent opportunity for a successful pre-emptive strike. By contrast, in 1973, the time factor was not in Israel's favour. Although the IAF had already been ordered, early on 6 October and before the start of
mobilization, to prepare for a pre-emptive strike around midday, it is very doubtful that it would have been ready to do so as efficiently as in 1967. Lacking time to update plans, prepare and disseminate operational orders, conduct the necessary meetings for coordination, transport and load the required amounts of ammunition, and carry out briefings on targets at all levels of command, the result would have been rushed and less professional.

Two factors support the view that it was military rather than political considerations that counted in 1973. First, in 1967, there was even more political pressure on Israel than in 1973 to refrain from a pre-emptive strike, yet Israel went ahead anyway. (31) Secondly, unlike in 1967, there was some confirmation from Israeli military commanders that a pre-emptive strike would not have been successful. (32) It was mainly Defence Minister Dayan who opposed it - arguing that the cost would be high because the Air Force would be flying against an alert missile screen. (33) This indicates that without these military objections, the Israelis might have carried it out.

Even if Israel had carried out a pre-emptive strike, military considerations would most likely have doomed it to failure. In 1967, as soon as the Israeli pre-emptive strike had been successfully conducted along with a major ground offensive, the Egyptian command and control system collapsed because of the absence of orders to units and formations. Under Israeli pressure from the ground and the air, following reallocation of IAF missions, Egyptian ground defences were
easily broken. The situation in 1973 was different: the initiative was on the Arab side, as it was fully prepared to start an offensive. An Israeli pre-emptive strike on 6 October - even if it had been successful in damaging the command and control system - would have had only limited effect on events, since all units had already thoroughly rehearsed the crossing operation. Thus, an Israeli pre-emptive strike in 1973 would not have prevented the Egyptians from crossing the Canal.

The general theory of pre-emptive strikes emphasizes the main objective of interfering with enemy war preparation and damaging his capacity for reaction, by exploiting his peacetime vulnerabilities. It identifies several specific objectives for a pre-emptive air strike: destruction of enemy airfields and aircraft; disruption of the command and control network (especially its radar systems); destruction of ground-to-air and ground-to-ground missiles; bombardment of enemy troop concentrations (including bridging equipment in the case of Egypt); and deep strikes on strategic targets. (34) Under pressure of time, Israeli priorities in a pre-emptive strike would not have been the same as in 1967, nor as easy. If airfields and aircraft were selected, the damage would have been minimal as Arab aircraft were now placed in hardened shelters and as Israel did not have bombs effective against aircraft shelters. (35) Israeli aircraft could have attacked the runways but they would be exposed to effective air defences. If priority were given to SAM sites, the cost would have been as high, since they were on the highest degree of alert, while the Israelis had no previous knowledge of the SAM-6. This view is supported by the fact
that at the beginning of the war, the Israelis avoided attacking the 
SAM sites and waited until they developed new tactics and 
countermeasures. It is true that the Israelis targeted the SAM sites 
later in the war, but that was after they had established a gap in the 
SAM defences on the west bank of the Canal and after they had acquired 
more information about the SAM-6. (36)

An additional consideration is that Israeli decision-makers would 
not have known, in 1973, just how effective the combination of 
missiles and anti-aircraft guns was going to be. They were surprised 
by the performance of the SAM-6 in the 1973 War, and took some time to 
learn more about it. An Israeli pre-emptive strike on 6 October would 
have been conducted in the absence of accurate information about Arab 
defences, with the result that the IAF would have lost more aircraft - 
due to greater initial aircraft density - than the actual loss 
suffered later in the war during air defence suppression missions. 
Indeed, even with more time and information the IAF still did not 
perform the aforementioned traditional pre-emptive missions with great 
success. The IAF attacks at the beginning of the war failed to reduce 
the effectiveness of the SAM complexes, and heavy Israeli losses 
dictated avoiding the SAM network altogether whenever possible. (37) It 
is true that the urgency of targets in the Syrian front dictated that 
most IAF efforts be diverted there for some time (from 7 to 11 
October) but the elimination of the Syrian threat and the achievement 
of stability on this front after 11 October were not followed by a 
resumption of attacks against Egyptian air defences.
Looking at the Arab side, the most significant change between the 1967 and 1973 wars was the reduced vulnerability of Arab Air Forces to airfield interdiction. In 1967, the IAF flew about 1000 sorties in the first day, destroying most of the Arab Air Forces on the ground. (38) Total Arab aircraft lost in the first day are estimated at 452. (39) In contrast, having flown about the same number of airfield interdiction sorties in 1973, the Israelis claim to have destroyed only 22 aircraft on the ground (even then, the Egyptians insist that no aircraft were lost this way). (40) Israeli attempts to destroy the Egyptian and Syrian Air Forces on the ground proved abortive, due to a combination of hardened shelters, improved runway repair procedures and stronger air defences. Higher safety of Arab aircraft in bases led some analysts to conclude that it was significantly more cost-effective for the Israelis to destroy Arab aircraft in air-to-air combat than on the ground. (41)

Experience during the war suggests that pre-emptive attacks on Arab ground forces would have had limited effect. On the Egyptian front, the IAF reacted with concentrated attacks against the Egyptian bridges, in the first 48 hours of the War, in an attempt to stop or delay the crossing. Heavy losses and poor results forced the Israelis to abandon this exercise. (42) Nor did pre-emptive attacks on strategic targets (economic or population centres) deep inside Egypt offer a better option. They would have had no immediate effect on the front, and the Egyptians would have retaliated against Israeli population centres. The arrival of SCUD-B surface-to-surface missiles days before the start of the War increased Egyptian deterrence capability. (43)
The results of the improved quality of Egyptian recruits, a reformed officer corps, and the intensive experience gained during the War of Attrition were very evident in 1973. Egyptian air defence crews had already demonstrated their improved skills when they moved forward over 12 SAM-3 batteries during a single night in August 1970. (44) In 1973, the Egyptian air defence also displayed considerable skill in repairing damaged sections of SAM sites during night time. The Israelis were surprised when SAM sites resumed operations after they had supposedly been destroyed the preceding day. This was the case, for example, when the Israelis concentrated their attacks against the extreme northern edge of the SAM belt in the Port Said sector in the first phase of the War. (45)

The Egyptian Air Defence: Battered or Defeated?

The view that the Egyptian air defence was defeated in 1973 is based on early, inaccurate reports (mainly in the press) of the number of destroyed SAM sites. Distortion is due also to the tendency to disregard almost entirely the impact on air defence performance of external developments in the ground battle, outside its own control. The Egyptian air defence may have been battered by the IAF, but not defeated.

During the War it was reported that the IAF had been able to achieve considerable results by turning to air defence suppression missions. For example, one press item claimed that the IAF had succeeded in destroying 50 per cent of the Syrian SAM batteries and
caused the rest to flee to Damascus. (46) It was also claimed elsewhere that the IAF managed to destroy more than six-sevenths of all Arab SAM sites, including four-fifths of the SAM-6 sites. Altogether, according to the same source, more than nine-tenths of all SAM sites knocked out were destroyed from the air, with relatively low loss of Israeli planes. (47)

Later, however, a different picture emerged. In a symposium, in 1975, the Director of Israeli Military Intelligence, General Gazit, estimated that the Egyptians had lost 44 batteries out of 146, and the Syrians three out of 34. (48) In the same symposium, IAF Commander Peled offered a different figure, stating that 52 Egyptian SAM sites had been destroyed, of which 40 were lost to air attacks. (49) Schiff put the estimate even lower: 32 Egyptian batteries and three Syrian ones. (50) Although the Egyptians declined to discuss their losses, one former Air Defence officer revealed that they lost 15 percent of their SAM batteries during the war (about 23 SAM batteries). (51)

Initial high estimates of Egyptian SAM losses were partly due to extensive use of dummy missile positions and radars, with the result that initial damage reports were exaggeratedly high. Another possible reason, as we shall see later, was the under-estimation of the Egyptian ability to repair damaged parts of the SAM batteries, and of the speed with which those sites once again became operational.

At the start of the War, the IAF began to use its normal practice of low-level delivery of munitions in attack missions. The Israelis
were forced by high losses to change their tactics to higher altitude attacks, with the result that attacks were far less effective than before. (52) As far as air defences were concerned, the Israelis were successful in dealing with the old SAM-2s and SAM-3s, but when faced with SAM-6 the same tactics brought only limited success. The Israelis made an intensive effort to develop new tactics to counter the effective SAM-6. They first tried a modification of a tactic which had been effective against old SAMs, namely a 'high-G, split S' evasive dive to the 'deck'. When an Israeli aircraft was alerted of a SAM-6 launch, it would turn towards the missile in a steep diving turn, and by diving under the missile launch, it would prevent the missile from out-maneuvering the aircraft. (53) In doing so, however, Israeli aircraft were exposed to murderous ground fire from ZSU-23-4s. Moreover, the 'ripple fire' technique which the Egyptian SAM batteries adopted made Israeli aircraft evasion much more difficult. (54)

Realizing how effective the mix of air defences was, the Israelis decided to avoid direct confrontation with them. According to a senior Egyptian Air Defence commander, 'Our highest compliment was received on the third day of the war when we intercepted a message from Lieutenant General Peled, Commander of the IAF, ordering his pilots not to approach closer than 15 miles to the Canal'. (55) Facing this strong challenge, the Israelis eventually chose to fly at high altitude. Observing the EAF's safe corridors through their radar screens, they were able to utilize them for target approach, but failed, nonetheless, to achieve significant results. (56) Similarly, in attacking Syrian strategic targets, the IAF could only outflank the
Syrian air defences in the Golan by violating Lebanese and Jordanian air space. (57)

In effect, the IAF avoided attacking the Egyptian SAM belt after the initial stage of the War until the ground forces had established a gap in that system. Moreover, the Israeli ground forces' success in breaking through and starting to destroy SAM sites enabled the IAF to operate freely in that gap and then to expand it. The high Egyptian losses in SAMs compared with the Syrian losses suggest that it was the success of the Israeli ground forces that made the crucial difference. Dupuy concluded that the most effective action against air defences was the ground offensive that either destroyed the SAMs or forced them to displace. (58) Schiff also arrived at a somewhat similar conclusion. He stated that the IAF did not recover its effectiveness against the SAMs until the closing stages of the War, once the ground forces had made significant advances. (59)

The Syrian decision to pull back their SAM batteries was taken to defend high value targets in the interior which the Israelis started to attack early in the War, although it is also true that the Israeli ground counter-attack had imposed a thinning out of the dense SAM deployment in the Golan anyway. (60) On the other hand, the Egyptians admit that some of their SAM batteries were put out of action through air strikes during the fight, but claim that they were able to repair them in a relatively short period of time. (61) The Egyptians also assert that most of the damage to SAM batteries was caused by ground forces. (62) The fact that the hit-probability of direct hits from
nearby ground forces (mainly tanks) was likely to be higher than from high-level air bombardment, and the difference in estimates of Egyptian SAM losses between Israeli Army and Air Force senior officers give the Egyptian assertion greater credibility.

The effect of artillery and other direct fire guns against the SAMs and the anti-aircraft guns, whether by scoring direct hits on equipment or by killing and harassing personnel, must not be underestimated. The Israelis pushed their long-range 155mm and 175mm field artillery guns close to the front primarily to attack the SAM sites. (63) These weapons were especially effective against heavy equipment in fixed positions. Of great significance was the destruction by artillery fire of five Egyptian batteries out of the nine moved to the east bank on 13 October. As a result, the Egyptians withdrew the rest of the batteries, failing therefore to roll their SAMs forward and extend coverage over Sinai. (64)

Disagreement on the role of ECM equipment and stand-off weapons during the War is due to the fact that there was no conclusive evidence of ECM effectiveness during the War, and to the lack of opportunity to evaluate new, advanced US equipment supplied to Israel during the conflict.

At the outset of the 1973 War, the Israelis were surprised that ECM equipment with the IAF was unable to jam the acquisition and tracking frequencies of the SAM-6 and ZSU-23-4 systems. In addition, the aircraft warning receivers were unable to detect the launch of the
SAM-6. (65) An Egyptian General quoted an Israeli pilot shot down over the missile belt who said: 'They said if we had the pods (ECM) we could go in safely. I had the pods but here I am'. (65)

Thus, although the Israelis were in a far better condition for electronic warfare than their opponents in the 1973 War, they were not without problems. Their equipment was inadequate in quantity as well as in its inability to cope with new threats. Additional problems were related to employment concepts, inadequate intelligence, and poor planning procedures. (67) Israeli failure in penetrating air defences during the first stage of the War led to requests for new, and more, American EW equipment.

Starting from 13 October, the US began to provide Israel with assistance in electronics and other counter-measures needed to defeat the new air defence systems fielded by the Arabs, and to provide the IAF with penetration capability. The latest American jamming equipment at the time, such as the Sanders Associates ALQ-126 deception ECM, the Westinghouse ALQ-105/ALQ-119 and the Raytheon ALQ-99 smart noise jammers were brought to Israel during the War. (68) Specialists and technicians were also rushed in for help and consultations. Several different types of US stand-off weapons were also rushed to Israel during the conflict, including Walleye and Hobos guided bombs and Maverick and Shrike air-to-surface missiles. (69)

These systems were tried in the closing stages of the battle (after establishing the gap in the Egyptian air defence). There is, however,
no conclusive evidence to suggest that their introduction significantly influenced the outcome of the War. Moreover, the performance evaluation of this equipment was clouded by the variety of equipment introduced, lack of personnel training, and poor coordination. This conflicts with one analysis of the Israeli experience, which argues that the aircraft which were equipped with ECM equipment suffered the least loss and damage, while the aircraft which had little or no EW equipment suffered the most. (70) The analyst overlooks the fact that the EW-equipped aircraft were also fastest, while those without EW suites were the slowest. Speed was a major factor in loss or damage caused by the SAM-7. (71) Moreover, fast and slow aircraft have different basic roles, which affect their exposure to air defences. Slower aircraft, unlike fast ones, were used exclusively in the ground attack role, which exposed them for longer times to ground-based defences.

As far stand-off weapons, there seem to have been fairly effective, but did display certain deficiencies. For example, the Maverick could not acquire a medium-sized target like the tracked radar vehicle of the SAM-6 until the aircraft was six to eight miles from the target, which brought the aircraft within the lethal range of the air defence. (72)

In conclusion, the IAF was not successful in defence suppression on its own. The ground forces' advance opened the way for the IAF, which in turn helped the ground forces. Even with this gap though, the Egyptian air defence was not totally defeated: IAF operations were
confined to the gap area, supporting the conclusion that the air
defence remained effective elsewhere.

How Effective were the Different Air Defence Elements?

Fashionable views concerning the most effective air defence weapon in the Arab inventory during the 1973 War vary between the SAM-6 and the ZSU-23-4 anti-aircraft gun. (73) The fact is that no single weapon can be judged in isolation to be the most effective. Rather it was the mix of two clusters of weapons, namely the SAMs and AA systems that ensured effective coverage and scored hits at different altitudes. The uncertainty is a result of the technical surprise due to the appearance of previously untried weapon systems on the battlefield, the difficulty in determining the causes of aircraft losses, and the tendency to disregard factors related to human errors.

Initially, much publicity was given to the SAM-6 and SAM-7 and to the anti-aircraft ZSU-23-4 gun. It was believed that most Israeli aircraft losses were caused by these systems, whereas static SAM-2 and SAM-3 were given much less credit in downing Israeli aircraft. (74) One Israeli scholar has concluded that Arab AAA, and the ZSU-23-4 in particular, were the most effective during the 1973 War. (75)

Since 1973, estimates of the effectiveness of the SAM-6 and SAM-7 have changed. According to one report, the SAM-6 scored some kills, but its main contribution was in sending the Israeli attack planes into their standard evasive dive action which brought them into range
of the ZSU-23-4 guns. (76) In fact, though, it was not the SAM-6 which forced Israeli aircraft down, but Israeli tactics and missions. At the beginning of the War, the Israelis followed their usual practice of low-level delivery of munitions in close support and interdiction missions. (77) They were forced to change their tactics due to the dreadful losses of the first few days, and so to attack from a higher altitude than was their usual practice. Changing tactics exposed Israeli aircraft to SAMs, including the SAM-6, which represented about 10 percent of total Egyptian high-level SAMs (80 launchers out of 760). Israeli inability to jam the SAM-6 led to over-estimation of their effectiveness. The fact that most IAF losses were suffered during the first few days, when most of its effort was directed to close air support, indicates that the contribution of high-level SAMs was less than that of AAA. (78)

As far as the SAM-7 is concerned, more than 5000 missiles were fired, but they only shot down four Israeli planes, according to Israeli sources. The sources admit that greater numbers of aircraft were damaged by SAM-7s, usually in the area of the exhaust, but most were able to return to base to be repaired and return to action. (79)

The Egyptians had over 2,500 anti-aircraft guns including 150 ZSU-23-4s, while the Syrians had about 1900 AAA including 100 ZSU-23-4s. (80) According to an Israeli source, this complex of Arab AAA accounted for about 40 percent of the 115 Israeli aircraft lost. (81) As the IAF had to fly low in attacking Arab tanks, artillery and vehicles at the beginning of the War, particularly in the Golan
Heights, AAA had a better chance to score more kills. It is difficult for either side, however, to decide the number of kills each AAA system was responsible for. Considering the number of the ZSU-23-4s, which represented less than one percent of total Arab AAA, the judgement that it was the most effective lacks evidence. In contrast with earlier wars, increased Israeli aircraft losses in absolute terms to Arab AAA in 1973 might at first appear to suggest high effectiveness of these systems, but it was the integration of these systems that counted. The conclusion that it was the new AAA systems, and in particular the ZSU-23-4, which made the difference in 1973 is clouded further by the results of the 1967 War. In 1967, for example, older systems such as the 37 and 57 mm guns constituted most of the Arab inventory of air defence systems, and yet inflicted as high a loss rate per sortie on the IAF as in 1973. (82)

Earlier reports about the 1973 War claimed that the SAM-2s were ineffective because of Israeli counter-measures. (83) Later, however, most sources estimated that about 40 percent of Israeli losses were attributable to SAM-2s and 3s. Previous Israeli methods of dealing with the SAM-2 and SAM-3 tended to rely more on tactics than on employing counter-measures. (84) As a result, the Israelis were not adequately prepared for EW, nor was their inventory of such equipment enough to cope with the increased number of SAMs in 1973.

Despite the publicity given to the newly introduced air defence systems, however, all suffered from technical problems which reduced their effectiveness. Although the SAM-6 was an important element in
the Egyptian air defence in the 1973 War, it had its limitations. These included its shallow initial launch angle and the lack of missile manœuvrability to intercept a steeply diving aircraft, which enabled Israeli aircraft to evade it by adopting certain tactics. Another, more important limitation was the lack of mobility. Soviet SAM-6 batteries received their long-range search, early warning, target acquisition and altitude data from the Long Track Radar and the Thin Skin height-finder, both of which were mobile radars. But Egyptian SAM-6s were not equipped with the Long Track Radar in 1973. To compensate, the Egyptians used Flat Face radar, which was not a mobile radar system. (85)

The SAM-7 was ineffective against modern jet fighters, and was most effective against slow targets flying at 250 knots or less. Its lack of lethality was mainly due to its small war-head. Its primitive seeker head - unlike those of more sophisticated heat-seeking missiles - was uncooled and easily saturated from other heat sources including the sun, the ground and flares. These limitations, along with its instability, made the SAM-7 less accurate. The SAM-7 was highly susceptible to counter-measures, a wide range of which were developed to reduce its effectiveness, such as flares, heat suppressors installed around aircraft exhausts, infra-red decoy pods and evasive manœuvring. (86)

The ZSU-23-4 gun had a number of problems, including over-heating, which limited the time it could sustain an effective rate of fire. The system was susceptible to 'runaway' firing while traversing after fire
has supposedly ceased, its radar could not be used against targets at altitudes below 200 feet and could not detect small targets, and a long time was needed to be able to engage a target when using the radar to aim the gun. (87)

A major problem in determining which system was the most effective stems from the difficulty in deciding the number of kills each system inflicted. It is difficult to determine the causes of Israeli aircraft losses from Israeli sources because this would depend largely on pilots' reports. As the vast majority of Israeli aircraft losses fell either inside enemy territory or over the front, in which case recovery of wreckage was almost impossible, pilots' reports were the main source of information. The time span allowed for a fighter pilot to observe an approaching missile aimed at his aircraft or a nearby one is usually too short to enable positive identification. In some cases, furthermore, pilots of destroyed aircraft did not have the chance to report and in other cases did not see the missile before the hit. Had they seen the missile, they would have reacted to avoid it. Thus, the recognition of SAM types was difficult. Most important here is the human tendency to attribute losses to the unknown. Pilots of destroyed aircraft tended to attribute their hits to the SAM-6 rather than the old SAM-2, although they could not have always had sufficient evidence. It is possible, too, that Israeli pilots with experience in dealing with the SAM-2 and SAM-3 may have unconsciously avoided admitting falling victim to old systems.
Finally, there is very little evidence from the defenders themselves. The difficulty of determining which air defence component was most effective was confirmed by the findings of an Egyptian committee set up immediately after the War for this purpose. Nonetheless, while admitting the difficulty of establishing the truth, its chairman judged that the most effective weapon was probably the SAM-2. This view was based on the experience factor. The Egyptians had used this system for 11 years, and so could use it to greater effect. More important, according to the chairman, was that the Egyptians had gained considerable experience in an EW environment during the War of Attrition, which enabled them to operate SAM-2s effectively during the 1973 War. (88)

Egyptian and Syrian Fronts: Similarities and Differences.

The Egyptian military command recognized the superiority of the Israelis in the air, and intended to compensate for their inferiority by avoiding direct engagement between their Air Force and the IAF. Instead, they intended to use surface-to-air missiles as their primary weapon against Israeli aircraft. Unlike the Egyptians, the Syrians retained a more balanced aircraft and anti-aircraft mix. (On the eve of the 1973 War, Syria had about 300 aircraft, 1000 AAA and 33 SAM batteries, compared to Egypt's 550 aircraft, 2500 AAA and 150 batteries.) Nevertheless, the Syrians relied on their ground-based air defences in providing air cover for their forces against the IAF. Although they had less experience with the IAF than the Egyptians, the Syrians were faced with the same kind of pressure. They had paid a
heavy cost for attempting to engage the IAF occasionally, as in the air engagement of 13 September 1973 near the Syrian port of Latakia, when 12 Syrian MiG-21 fighters were shot down for the loss of one Israeli plane. (89) Although little is known about Syrian military thinking prior to the 1973 War, it seems most likely that the Golan topography, which is more conducive than the Canal zone to air defence reliance, was a crucial factor in the way the Syrians sought to fight in 1973.

Occupied by the Israelis in 1967, the Golan is an elongated plateau about 17 miles across from east to west at its widest point, and some 35 miles from north to south. On the western side steep cliffs descend into the Upper Jordan Valley, while to the south lies the cliff gorge of the Yarmuk River. To the north is the elongated mountain massif of Mount Hermon, while on the eastern side of the plateau the country becomes rolling and more open.

This topography made the task of the Syrian ground-based air defences much easier than the Egyptian one. From their original hardened sites west of Damascus, the Syrian SAMs covered the whole Golan Heights. Moreover, the narrowness of the front allowed a concentrated coverage of the space over the battlefield. Thus, there was no need for the Syrian SAMs to roll forward to cover the ground attack in any phase, a task which the Egyptian air defence confronted but failed to fulfil.
In the 1973 War, both Arab countries fought in the same way: in the offence, the ground forces would gain ground, consolidate their new positions and then hold, with SAM-2 providing constant cover. At the same time the vulnerability of their aircraft was reduced through being dispersed to hardened shelters. Thus, holding the aircraft in reserve would leave most of the Air Force free for missions in which their inferiority would not be so markedly evident, such as surprise attacks.

Although the strategies of both countries were similar in principle, there were three main differences in implementation; aircraft roles, air fighting within the SAM coverage and escalation of the air war. From this point of view, the Egyptians were more orthodox in their strategy than the Syrians.

A major difference between Egypt and Syria was the contrast in how they implemented similar strategies that called for aircraft to provide only limited close support. The Egyptians kept close to their strategy and did not attempt to provide effective close air support to their ground forces, except during the later stage of the war when the situation on the west bank of the Canal became dangerous. The EAF was then employed to attack Israeli armour as it approached Suez City. Reflecting their desperate situation, the Egyptians used their Czech-built L-29 Delfin jet trainers (equipped to deliver rockets and bombs) in these battles. A number of these aircraft were lost, but the Egyptians believe that they performed effectively in this situation. Even then, the effectiveness of the EAF was reduced by
the fact that it was difficult to identify targets among the intermingled troops. (91)

Unlike the Egyptians, the Syrians provided close air support from the beginning, flying low with MiG-17s while MiG-21s patrolled above. Nonetheless, Syrian close support was less effective than that of the IAF because the US-built planes carried much heavier payloads. (92) Syrian fear of full-scale air engagements with the IAF prompted hit-and-run tactics, but the Syrian ground-attacks nevertheless led to the intensification of air engagements on the Golan front early in the War. On the Egyptian front, on the other hand, heavy air-to-air engagements only took place during the last stage of the War, when the Israelis managed to break through in the west, forcing the EAF to fly close support missions. (93) In any case, the topography of the Syrian front restricted the ground-attack force to employment against combat formations, whereas on the Egyptian front surprise ground attacks were directed against Israeli second echelon units outside the SAM belt coverage.

That the Syrians were able to provide close air support and attack Israeli combat formations on their front, within the SAM umbrella, leads to the second main difference: that all Syrian Air Force operations took place within the SAM coverage. This not only included ground attacks, but use of their MiG-21s in fighter defence. An implication is that the Syrians managed to coordinate the action of their SAMs and aircraft in air space defence, while the Egyptians avoided the SAM zones altogether.
Although both Air Forces had a similar problem with their IFF equipment, and lost some aircraft to their own defences, the difference in practice stemmed from different command structures. (94) The Egyptian air defence weapons and combat aircraft had their own independent separate commands. Egyptian interceptors were put under the command of the Air Defence, but the rest of the Air Force functions remained in Air Force command, therefore requiring a higher degree of coordination overall. The Syrian case was different because air defence was directly under the command of the Air Force. All air defence and Air Force assets were controlled by the same operations room, which made it possible to operate aircraft inside the SAM envelope with more success.

Finally, there was a difference in the way the air war escalated on the Syrian and Egyptian fronts. The launch of a number of Syrian surface-to-surface Frog missiles (70 mile-range) at Israeli settlements in the north prompted an Israeli reaction. (95) In retaliation, the IAF conducted a round of deep interdiction missions on the Syrian front against administrative and economic installations. Thus, by using their missiles rather than withholding them as a deterrent, the Syrians encouraged Israel to utilize the long reach of the IAF in deep attacks.

In contrast, Israeli air attacks on the Egyptian front did not include targets in the depth of Egypt. A few years earlier, however, during the War of Attrition, the Israelis had attacked targets in the depth of Egypt and were only stopped by the actual presence of Soviet
forces. In 1973, despite the fact that the Egyptians launched about 20 Kelt air-to-surface missiles (range: 100 miles at low altitude, 200 miles at height) against Israeli targets, the Israelis did not attempt raids on deep targets. It seems that as the Israelis gave higher priority to the Syrian front early in the War, they chose to comply with the rules set by the Egyptians; Egyptian attacks were restricted to military targets. In addition, the Israelis might have estimated that the cost they would have to pay for these attacks in 1973 would be higher than in 1970 due to the stronger Egyptian air defences, besides the fact that such attacks on a vast country like Egypt would have little effect on the front. Even after neutralizing the Syrian threat, the Israelis did not attempt such attacks on Egypt. The Egyptian threat of retaliation if their civilian targets were attacked, and possible Israeli knowledge of the arrival of Scud missiles, may have been the reasons behind the Israeli decision not to strike deep into Egypt. In a speech on 16 October, President Sadat stated that if Israel were to attempt a major penetration, Al-Zafir Egyptian surface-to-surface missiles would be used against Israeli population centres. The shipment of Soviet Scud surface-to-surface (160 mile-range) missiles to Egypt, shortly before the start of the 1973 War, added to Egyptian deterrent credibility.

Egyptian Alternative Strategy

Should the Egyptians have adhered to their original objectives in 1973, or should they have aimed to advance and seize the Sinai Passes in the first phase? Was an opportunity to take advantage of the
surprise inflicted on the stunned Israelis in the first few days and advance rapidly to the Passes lost, and was there a similar failure to take advantage of the heavy losses incurred by the IAF at the beginning of the War by attacking its bases? (97) This controversy continues unabated in Egypt, especially in the light of the increasing number of memoirs published by former Egyptian commanders. (98) There are similar discussions in western circles, too.

The views of those who believe that Egyptian strategy should have been more aggressive, to include the seizure of the Passes in the first phase, arise from misconceptions regarding the capabilities of the Egyptian Armed Forces. They also rest on results that were only known in retrospect, and were therefore beyond the knowledge of Egyptian military planners at the time.

Egyptian military capability, when compared to the Israelis, did not permit adoption of a different strategy nor the pursuit of more ambitious military objectives. The Egyptians were successful when they adhered to the guidelines of their strategy, and failed when its principles were ignored, resulting in a shift of the advantage in Israel's favour.

Before proceeding further, the following facts must be reiterated: the bulk of Egyptian forces consisted of infantry units; most of the SAMs were immobile; Egypt had fewer armoured brigades than Israel; and the EAF was in no position to fight for air superiority.
As discussed earlier, there were hardly enough APCs for the mechanized infantry, let alone for the Egyptian infantry which represented two-thirds of all combat units, with the result that the bulk of the Egyptian Armed Forces was immobile. Similarly, the air defence was largely static, as most SAMs were placed in hardened shelters. Moreover, the self-propelled ZSU-23-4s and SAM-6s were untried in mobile combat operations, as distinct from moving between one static position and another. Regardless of whether it was due to lack of coordination or to human error, the fact remains that the Egyptian attempt to roll the SAMs forward on 12/13 October failed dismally.

In considering the strength of Egyptian armour and its employment, it should be noted that the five Egyptian infantry divisions undertaking the task of crossing the Suez Canal and establishing the bridgehead were given one armoured brigade each to reinforce their ability to withstand the expected Israeli counter-attacks. (99) Consequently, few armoured brigades remained to be used in a major advance towards the Passes in the first phase of the attack. Although the Israelis also had less forces in the first stage of the war, the Egyptian forces were vulnerable to air action as SAMs could not have been moved forward so soon. Furthermore, besides the need for time to move across more armoured formations, the Egyptians seem to have wanted to ensure success in establishing a strong and large bridgehead, which would allow enough space for manoeuvre, before doing so.
The EAF was not able to conduct deep strikes, nor would it have been able to reach IAF bases inside Israel proper. Egyptian bombers were vulnerable and needed air cover but their fighters lacked the range. Even if Egyptian Intelligence could have assessed accurately the remaining combat capability of the IAF after the first phase, it would have been extremely dangerous to risk sacrificing the EAF in view of its vulnerabilities. Furthermore, Egyptian ability to avoid losses in deep strikes was in doubt, as attacking aircraft were not supported with ECM; as it was, the Egyptians lost an estimated 75 aircraft to missiles and AAA in 1,500 offensive sorties, representing a high attrition rate of five per cent per sortie. In addition, had the Egyptians decided to press their air attacks, this would have led to more dogfights, a possibility they sought to avoid. An added consequence of these weaknesses was that the EAF was incapable of providing air cover for land forces marching out in the open in Sinai.

Most authors who suggest that the Egyptian operational pause after the initial crossing was an opportunity lost base themselves on the factor of surprise and its initial impact on the Israelis, and on the Israeli decision to give priority to the Syrian front in the first phase of the war. Egyptian planning was not, however, based on these assumptions, nor would it have been justified if it had been so. Egyptian planning did not consider the possibility of a quick Syrian success which would force the Israelis to give priority to this front. The Egyptians would not have been justified in assuming an early Syrian success drawing off a large part of enemy resources, as the possibility that an Israeli holding action would be enough in the
initial stage was also valid. Furthermore, the view that Egyptian planning was not flexible enough to take advantage of the Syrian success at such short notice tends to ignore the fact that the Egyptians, for their own considerations, did not consider, nor take seriously as a real possibility, an advance to the Passes in a second phase.

The Egyptian military command was later criticized, by Egyptians and non-Egyptians, for failing to take advantage of the situation created by the surprise to continue their offensive towards the Passes. In an interview with Heikal on 18 November 1973, Egyptian C-in-C General Ismail explained: 'We had begun the operations under the protection of our famous missile network. If I had to advance beyond that I would have to wait - even if there was an opportunity someone else could see or that I could see myself - until I made sure that my forces had adequate protection. Our Air Force performed heroic feats but if I had thrown in my Army in the footsteps of an available opportunity without any air defence cover against the enemy's air superiority, it would have meant that I was throwing the entire burden on the Air Force and assigning to it tasks which were more than it could stand... I abided by our plan... I mean our original plan which envisaged a build-up pause after completing the crossing operation... A pause during which I could make a re-evaluation of the situation in the light of the enemy's reaction'. (101)

In view of the above discussion and of the assessment of Egyptian military capability, the proposition that the Egyptians should have
expanded their offensive in the first phase to include the seizure of
the Sinai Passes has no realistic basis. The Egyptian command,
nevertheless, developed the offensive of 14 October, not only
venturing outside the SAM coverage but also committing their strategic
reserve from the west bank of the Canal. The attack failed, and was
followed by an Israeli counterattack and crossing of the Canal. This
raises the question of whether the Egyptians should have refrained
from attacking, and kept the armoured reserve formations (two
divisions) in their original position west of the Canal.

Had the Egyptians kept their armoured reserve west of the Canal and
other armoured brigades in their defensive positions in support of
Egyptian infantry within the bridgehead, they would have posed more
problems to the Israeli military command. Israeli armour would have to
attack Egyptian infantry in order to dislodge them, unaided by the
IAF. In doing so, Israeli armour would have lost the advantage of
mobility and speed. If the Israelis decided to concentrate on one axis
to break through the Egyptian defences, the uncommitted Egyptian
armoured brigades within the bridgehead would have been used to
support the infantry holding the defensive line in order to slow
Israeli attacks and to inflict heavy losses on their forces. Even if
some Israeli forces were successful in breaking through to the eastern
bank of the Canal, given that the Egyptian armoured reserve was still
intact in the west side, it is doubtful whether the Israeli command
would have decided to order a crossing operations.
Of more significance was that the Israeli counter-crossing which was allowed by Egyptian mistakes forced the Egyptian Air Force into battle inflicting heavy losses on it. Had the Israelis not crossed, the Israeli Air Force would have kept battling the ground-based air defences with increased losses on its part, while the EAF would have remained in reserve, as the Egyptians originally intended.

Although it is difficult to predict the outcome of this different scenario for the 1973 War, by not developing the attack of 14 October in the manner they did, the Egyptians could have kept the war on their terms; slow with heavy losses on the Israeli side until the expected international pressure interfered to force a ceasefire.

OTHER IMPLICATIONS

Thanks to its demonstrated superiority, the IAF was the main factor in dictating the limits on the scope of the Egyptian offensive in 1973. Military commentator Herzog reflected its reputation: 'This dictation would have been valid even if the IAF had not made one pass over the battlefield'. (102) Given the IAF's ability to direct devastating blows against forces every time they ventured outside the missile umbrella, and given the Egyptian failure to roll forward their SAM coverage, the Egyptians were justified in limiting their operations to areas covered by the missile belt.

The question which poses itself at this stage is, what were the advantages and the penalties of adopting this strategy? The
application and performance of the Egyptian air defence strategy during the 1973 War appear to have contained positive as well as negative elements. There follows a brief discussion of the positive aspects and an illustration of the negative implications of this strategy.

At the higher level, the Egyptian strategy was new and surprising to the Israelis as it implemented a strategic offensive with mainly defensive equipment and operations; for as soon as they were across the Canal, the Egyptians deployed in defensive positions and waited for the Israeli forces to attack. The Israelis failed to appreciate that the Egyptians would decide on a limited military solution to their problems, and would accordingly develop a limited strategy based on the missile belt. Israel's basic assumption was that the Egyptians would not attempt to cross the Canal until they enjoyed air superiority in Sinai. (103) Thus, the Egyptian offensive of 1973 took the Israelis by surprise, and had, therefore, an excellent chance of success. The crossing of the Canal on a wide front dissipated the force of the IAF. Moreover, the breadth of the crossing meant that it could not easily be prevented at all points along the Israeli defensive line, thus guaranteeing the Egyptians a number of footholds. Although by crossing on a broad front, and seizing a wide bridgehead, the Egyptians were left with no concentration of force to develop an attack, such an attack would have taken them outside the air defence umbrella and therefore was avoided as discussed earlier. In short, the Egyptian strategy worked and they were able to cross the Canal under their missile coverage as planned.
However, the Egyptian strategy also contained a number of problems which became more evident as the war progressed. These include: military initiative, Army mobility, strategic and tactical reconnaissance, Air Force missions and its increased vulnerability, the role of Egyptian commando units and the role of the Egyptian Navy.

Inherent in the strategy was the fact that once the Egyptian forces seized the bridgeheads they voluntarily abandoned the initiative to the Israelis. The Israeli delay in seizing the initiative after the crossing, however, was mainly due to the element of surprise and to the Israeli decision to give the Syrian front higher priority. After 14 October, the Israelis took the initiative and fought on their own terms. The Israeli break through west of the Canal led to the collapse of some basic assumptions of the Egyptian strategy (for example, through the Egyptian Air Force involvement in the last stage of the War).

The Egyptian strategy also dictated that most Egyptian forces would have to be concentrated and to operate within a limited geographical bound east of the Canal, causing as such further constraints on the Army's mobility. This concentration of Egyptian forces might have led to disastrous results had the IAF managed early in the war to neutralize the SAM threat and to operate freely against concentrated Egyptian forces.

As a result of their new strategy, the Egyptians were deprived of one very important instrument of intelligence gathering - namely, air
reconnaissance. (104) This was felt more acutely when the Israelis took the initiative after the first stage of the war and imposed a war of manoeuvre on their opponents. In this case, the battlefield situation had so changed that the importance of being able to find the enemy forces was crucial for proper, timely and sound decisions from military commanders. Many former Egyptian commanders believe that the failure of the Egyptian attack on 14 October was mainly due to the lack of information about the strength and the position of Israeli armour units. (105) This is not, however, to suggest that the confusion which prevailed in the Egyptian command at the time of the Israeli breakthrough on 15 October was entirely due to the lack of information. (106) The panic of the Egyptian top commanders contributed to the slow reaction and as a result, to the destruction of air defence sites in the area which finally gave the IAF free skies in which to operate.

The air defence strategy with its heavy reliance on ground-based air defences increased the vulnerability of aircraft to friendly fire. Western sources estimated that between 15 and 20 per cent of Arab aircraft losses were to their own defence systems. (107) Two facts give more credibility to these estimates. First, the Egyptians had a problem in air space management which was observed during the 1973 War. (108) Indeed, most methods of coordination between aircraft and ground-based air defences include serious disadvantages, and increase in case of mobile operations. Second, when the Egyptians declined to operate their aircraft within their SAM box coverage they suffered the least aircraft losses among the combatants in the 1973 War, but when
they were forced to change this policy after the gap in the SAM belt had been made on 16 October, their losses increased sharply. (109)

Although they declined to discuss it in details, the Egyptians interviewed for this study admit that they did lose a number of their aircraft to their own air defences. When pressed on this issue, they stated that their actual loss ratio was not high for an environment of dense air defence deployment and heavy EW. They argued that in modern battlefield conditions, the loss ratio will be higher than the level predicted by military analysts, adding that in the European environment, for example, Nato and Warsaw Pact forces would suffer a high percentage of losses due to friendly fire. (110) Implied in this is their perception that it was unavoidable that some increased risk would result from the the increased reliance on SAMs.

The Egyptian air defence strategy hindered the employment of the Air Force in missions other than fighter defence. Based on their new strategy and their assumption that the EAF would not have to provide close air support for ground forces, the Egyptians under-emphasized the need for joint training between ground forces and the EAF for this kind of mission in their preparation for the 1973 offensive. Moreover, close air support teams and communication equipment were absent from some Egyptian armour and infantry divisions. (111) The result was that when the war situation changed and the EAF was called to provide close air support, these missions were less effective because of the lack of coordination. The significance of the failure to provide Egyptian divisions with liaison teams for close air support was that it
demonstrated that there was no flexibility in Egyptian planning for the war.

In the early stages of the war, Egyptian commando units were used heavily. Using helicopters, the Egyptian command sent large numbers of them against targets deep inside Sinai. In most cases, these units either failed to achieve their aims because of their destruction before reaching their targets, or had little effect in disrupting Israeli lines of communication. (112) In the context of the Egyptian strategy, employing commando units in this manner resulted in two grave mistakes. First, landing commando troops with their light weapons and equipment behind Israeli lines and outside the Egyptian missile coverage meant that they were not only vulnerable to strong ground attacks, but also to air strikes. The Egyptian inability and unwillingness to fight for air superiority over Sinai, or to provide the commandos with air cover led to the destruction of these units, many through air action even before landing. (113) Moreover, most targets selected for commandos to hold were so deep in Sinai that either it would take a long time for the crossing Egyptian forces to advance and to link-up with them, or it was never intended to advance to these targets at all. (114) Second, the helicopters that transported Egyptian commandos were vulnerable to enemy air and ground forces, especially as they had to penetrate Israeli defences and fly well beyond the Egyptian air defence umbrella. The failure of the EAF to provide effective air cover for these aircraft led to heavy losses among them. The Israelis claim that during the war they shot down a total of 42 Egyptian helicopters, some loaded with commandos. (115)
This leaves the Egyptian Navy. By 1971, as they were reviewing their real capabilities in order to arrive at a suitable war strategy, the Egyptian command realized that a large naval force would be of limited use mainly because of the need to have air superiority if principal combatants (Submarines, destroyers and frigates) were to operate far from their bases. As a result, the Egyptian Navy was restricted in the 1973 War to operating close to the coast, where it was possible to provide air cover and coastal fire support. Despite its different composition and nature, the Syrian Navy was governed by similar considerations. (116)

Allowed this opportunity, the Israeli Navy took the initiative and launched aggressive action, closing in on the Syrian and Egyptian coasts and engaging their forces. Israeli vessels, using their missiles effectively and taking advantage of deficiencies in Soviet missiles, won the battle at sea. Among the naval confrontations won by the Israelis those at Latakia and Damietta stand out. (117) It is true that these battles were won without air support, but equally important is the fact that it was Egyptian fear of the IAF that allowed Israeli ships to operate in the high seas with impunity, free to develop their combat tactics. The situation of the Egyptian naval forces was further worsened by the absence of the reconnaissance element. (118) Finally, although the naval battles in 1973 did not have an influence on the final outcome of the war, they proved that air superiority over the area of sea operations remained a prerequisite for victory. To this extent, air superiority could only be achieved by fighter aircraft.
References


3. For a detailed description of Israeli defences on the Golan Heights, see Herzog, (1975), Chapter 5. On the obstacles, see also Wakebridge, p. 21.

4. The three infantry divisions were the 5th, 7th and the 9th division. Each division was composed of two infantry brigades, a tank brigade and a mechanized brigade. These three divisions had about 500 tanks. The two armoured divisions were the 1st and the 3rd armoured divisions totalling about 500 tanks.


8. For a detailed description of the battle of Mount Hermon, see Herzog, (1975), pp. 72-74; Wakebridge, pp. 21-22.

9. Most sources estimate Israeli aircraft losses over the Golan on this single day at around 30. See, for example, Luttwak and Horowitz, (1975), p. 374.

10. For more details on operations on the Syrian front, see Herzog, (1975), chapters 6, 7, 8, 9 and 10.


14. For a detailed Egyptian description of the Israeli defensive line see Ibid., pp 37-44. For an Israeli account, see Luttwak and Horowitz, (1975), p. 338.


16. This particular day was selected, among other reasons, because there was a full moon (needed for bridging operations during the first night). El-Badri et al, (1978), p. 49.

17. Ibid., pp. 61-70. For an Israeli account, see Herzog, (1975), pp. 146-181.


21. This gap was not covered by the SAM belt. Shazly, (1980), p. 236.

22. On the Israeli counter-attacks, see Herzog, (1975), pp. 185-190.

23. On the Egyptian decision to develop their attack and the different arguments of Egyptian commanders, see Shazly, (1980), pp. 245-250.

24. On the Egyptian losses, see Ibid., p. 246.


28. According to Herzog, in the early hours of Saturday morning, IAF
Commander Peled advised CoS Elazar that the IAF was ready to carry out a pre-emptive strike between 1100 and midday. This had to be postponed, though, because of low clouds over the Golan Heights. In any case, the IAF Commander was told at 1230 that such a strike had not been approved by the Government. Herzog, (1975), p.225.


31. In 1967, Israeli Foreign Minister Abba Eban returned from a consultative tour to Britain, France and the United States with warnings. De Gaulle had stated that, 'Israel must not make war unless it is attacked by others', while Lyndon Johnson warned, 'If you want our help in whatever ensues, it is absolutely necessary for Israel not to make itself responsible for the institution of hostilities'. Quoted in Brecher, (1974), pp.381,392-393. By contrast, in 1973, there were no ministerial consultative tours nor any presidential warnings, and so there was little political pressure on Israel to follow a particular course of action, especially as the Arab threat was real this time. It is claimed that Kissinger advised the Israeli embassy staff in Washington saying: 'Don't ever start the war. Don't ever pre-empt! If your fire the first shot, you won't have a dog catcher in this country supporting you. You won't have presidential support. You'll be alone, all alone. We wouldn't be able to help you'. Kalb and Kalb, (1975), p.520. This was, however, denied by Kissinger himself who told the press on 12 October 1973,'... the US had no occasion to warn any country against engaging in pre-emptive action'. 'Secretary

32. On this see, for example, Steven Rosen and Martin Indyk, 'The Temptation to Pre-Empt in a Fifth Arab-Israeli War', *Orbis*, Summer 1976, pp. 268-269.


34. Rosen and Indyk, p. 271.

35. Egyptian aircraft shelters were designed to stand up to the conventional bombs that Israel had at the time.

36. Most sources agree that the Israelis were surprised by the SAM-6. See, for example, Isby, (1981), p. 262. Within a week, American countermeasures equipment and spares were shipped to Israel along with specialists and technicians who were rushed in for help and consultations. Armitage and Mason, (1985), p. 137; 'US Spurs Countermeasures to Israel', *Aviation Week and Space Technology*, 22 October 1973, p. 20.

37. For example, according to Israeli historian Schiff, Israel lost six Phantoms in attacks on the Syrian SAM network although it did little damage to them. Schiff, (1974), p. 160.


41. See, for example, Coleman, 'Israeli Air Force Decisive in War', *Aviation Week and Space Technology*, 3 December 1973, p. 21.

42. Herzog, (1975), p. 285. Although there is evidence to suggest that the IAF scored hits on the bridges, the flexible construction of the
bridges enabled them to be repaired rapidly. Referring to the Israeli
attacks after the war, General Shazly explained that this flexibility
allowed for their repair by an exchange of sections 'in a matter of no
more than an hour'. Shazly, (1980), p.156.
43. See, for example,'Israeli Aircraft, Arab SAMs in Key Battle',
44. On this see, for example, Fawzi, (1984), p.324.
admitting that after the first few days the IAF limited its canal
attacks to the extreme flanks of the front, claimed that the IAF
attacked the five missile batteries in Port Said on 9,10,12 October,
and that by 13 October the air space over Port Said was open. The need
to repeat the air attacks against these five batteries support the
view that the Egyptians were able to repair damaged batteries quickly.
46. Coleman, 'Israeli Air Force Decisive in War', Aviation Week and
47. According to Ra'anan, who did not refer to his source. 'The New
Technologies and The Middle East War', in, Kemp et al, (1975), pp.84-
85.
51. According to Qarramany, a former Air Defence General in an
interview, Cairo, 23 August 1988.
57. Whetten claims that two Israeli aircraft were downed by the Jordanians and that Israel then avoided violation of Jordanian air space, instead accepting the heavy cost of frontal attacks. Whetten, (1974), pp. 265-266.
62. Ibid., p. 79. the same views were repeated in interviews with General Fahmi by Western journalists. See, for example, Robert Hotz, 'Battlefield Equation Changes Seen', *Aviation Week and Space Technology*, 14 July 1975, p. 15.
63. That the Israelis pushed forward their long range field artillery guns was confirmed by Dupuy. Dupuy, (1978), p. 594.
70. Hartman and Lake, p.71.
71. Ibid., p.71.
73. On this see for example, Ra'anana, in, Kemp et al, (1975), p.84. See also, 'Soviet SA-6 Used Effectively in Mideast', Aviation Week and Space Technology, 15 October 1973, p.17.
74. 'Israeli Aircraft, Arab SAMs in Key Battle', Aviation Week and Space Technology, 22 October 1973, p.15.
75. Ra'anana, in, Kemp et al, (1975), p.84.
78. Herzog quoted Israeli Minister of Defence in 1973 as saying that the Israelis had lost 50 aircraft in the first three days of the war. Herzog, (1975), p.260. Estimates as to Israeli losses in the first week of the War vary between 60 and 80 aircraft out of total losses of about 115 aircraft.
79. Ra'anana, in, Kemp et al, (1975), p.84.
81. Ra'anana estimates that Arab AAA accounted for over 40 per cent of Israeli plane losses, while the older SAMs, SA-2 and SA-3, accounted for less than 40 per cent. The SAM-6 and SAM-7 accounted for 10 and 4 per cent, respectively implying that about 6 per cent were lost in air-to-air combat. Ra'anana, in, Kemp et al, (1975), p.84.
82. According to an Israeli General, in the 1967 War the IAF attrition rate per mission was 1.4 per cent. On the first day IAF losses peaked
at 4.0 per cent. In the 1973 War, the IAF attrition rate was an average of 1.1 per cent. The attrition rate in the first two days reached the average figure of 4.0 per cent. R. Sivron, 'Air Power and Yom Kippur', in Feuchtwanger and Mason, (1979), p. 89.

83. See, for example, 'Israeli Aircraft, Arab SAMs in Key Battle', Aviation Week and Space Technology, 22 October 1973, p. 15.
87. Ibid., pp. 238-240.
88. In an interview with General Musallam, the chairman of the Committee, Cairo, 18 August 1988.
90. In an interview with then Air Marshal Hosny Mubarek, referring to this aircraft, he said: 'During 100 missions only two were lost and [among a total of] 129 losses during the war were only three or four [IL-29s].' Egypt's Air Force, Flight International, 13 March 1975, p. 419.
94. In general, it was estimated that between 15 and 20 per cent of the Arab aircraft losses during the 1973 War were caused by their own


96. On Sadat's speech, see El-Rayyes and Nahas, (1973), p.274. The 300 km. 'Zafir' surface-to-surface missile was developed with the help of German scientists beginning in 1961. The failure to develop an accurate, reliable guidance system for the Zafir resulted in production ceasing in the mid-1960s.

97. On these points see, for example, Armitage and Mason, (1985), pp.133-134.

98. An example of those who believe that the Egyptian command should have maintained its original objectives is General Shazly. In contrast, General Fawzi believes that Egyptian forces should have advanced to seize the Passes in the first phase of the offensive. These were the main themes of their two books. Shazly, (1980); Fawzi, (1988).

99. This was additional to their organic tank battalions. General Fawzi, for example, considers this decision to be one with grave consequences, as the principle of concentration of effort was lost. Fawzi, (1988), pp.65-72.


103. The assumption in the Israeli General Staff was that Egypt would not be able to achieve air superiority before 1975. Herzog, (1975), p.276. Interestingly, Nasser predicted early in 1970 that this was the year when Egypt might achieve parity with Israel in the air.
104. According to Fawzi, the Egyptian decision to terminate the services of the Soviet troops in 1972, which included strategic and tactical reconnaissance, without finding other means to acquire the needed information was responsible for the Egyptian failure from 14 October on. Moreover, the Egyptian command reluctance to use the Air Force in this role contributed to the field commanders' lack of information. Fawzi, (1988), pp. 175-176.

105. For example, in an interview with General Musallam, Cairo, 18 August 1988.

106. Shazly maintains that President Sadat's interference and his over-ruling of the decisions of the professional military commanders was responsible for the Egyptian failure in the second half of the War. Shazly, (1980), pp. 266-291. Fawzi also devoted a chapter in his book The October War, to explain why the Egyptian command and control system failed to function properly during the War. See Fawzi, (1988), pp. 184-195.

107. On this see, for example, Plait, (1974), pp. 154. This was also quoted by Armitage and Mason, (1985), p. 134.


109. During the first ten days of the 1973 War, Egyptian aircraft losses was estimated at around 64 MiGs. After 16 October Egyptian losses increased to reach about 222 MiGs by the end of the War. For the first estimate see, 'Israeli Aircraft, Arab SAMs in Key Battle', Aviation Week and Space Technology, 22 October 1973, p. 16. For estimate on the total losses, see Dupuy, (1978), p. 609.

110. General Sealawi, an Egyptian Air Defence officer, explains that because industrial countries have not had recent combat experience in
a complex environment, the problem of aircraft vulnerability to friendly defences is not fully appreciated. In an interview, Cairo, 1 September 1988.

111. Fawzi claims that during the operations, Egyptian Armies could not ask for close-air support without authorization by the General Headquarters. Furthermore, even in the few cases when it was authorized, such as the support for the 21st Armoured division in its offensive on 14 October the liaison teams needed for coordination with the Air Force were not available. Fawzi, (1988), p. 179.

112. Four battalions of Egyptian commandos totalling about 1500 personnel were dispatched to four main areas behind the Israeli defensive line in Sinai. Shazly, (1980), p. 234; Fawzi, (1988), pp. 79-80, 174.

113. Israel claimed that 20 Egyptian helicopters, some loaded with commandos, were destroyed during the first day of the War. Nicolle, 'The Holy Air War', Air Enthusiast International, May 1974, p. 242.

114. Two main areas selected for the Egyptian commandos to hold were east of the Gidi pass and Sider pass, both of which were far away from the Egyptian bridgehead on the east side of the Canal. Fawzi, (1988), pp. 79-80. Apparently, the Egyptians attempted to link up with forces in the Sider pass on 10 October, but the First Infantry Brigade was destroyed by the IAF in this attempt. Shazly, (1980), p. 243.


116. The Syrian Navy consisted mainly of missile and torpedo boats.

117. For a detailed description of these sea battles see, for example, Herzog, (1975), pp. 264-269. For an Egyptian account, see Fawzi, (1988), pp. 145, 155.
Unlike the Egyptians, the Israeli naval forces, as a result of air superiority, were able to call on helicopters for support in early warning and tactical reconnaissance. Heavy use of helicopters by the Israeli Navy was evident in the 1973 naval operations. See, for example, the description of these battles in Herzog, (1975), p.267.
In launching its 1973 offensive, Egypt adopted a new military strategy. Specifically, this strategy revolved around the ability of its air defence to neutralize the Israeli Air Force, whose role in determining the outcome of conflicts since 1948 had always been decisive.

The central question posed in the introduction to this thesis was why and how Egypt changed its military strategy - and in particular its air strategy - in the confrontations with Israel between 1967 and 1973. A supplementary aim was to evaluate this strategy in action. These are the issues to be addressed in the following three sections that form the conclusion to this thesis.

Background for the Change

The 1967 War and its consequences transformed Egypt's environment to the degree that a change in past policies and strategies - both military and political - became not only an expectation but a demand shared by all sectors of the public, government and the Armed Forces.

The shock of Arab defeat left the Egyptian people feeling that they had been deceived and that their leadership was unable to defend them or their country. For its part, the Egyptian leadership felt that it had lost credibility and that the regime's policies and underlying
philosophy had been undermined. The strongest impact of the 1967 War was, however, on the Egyptian Armed Forces. Despite the fact that the defeat was the result of failure at both the political and military levels, the Armed Forces alone were held responsible for it. As a result, the military institution - unlike the political establishment - was subjected to major changes after the 1967 War.

The first big change in the Armed Forces was the dismissal of the regime's strongman, Nasser's close friend and C-in-C, Marshal Amer. This was accompanied by the dismissal of most of the top commanders (whose loyalty in most cases was to Amer) and the appointment of new commanders. These steps necessarily weakened Amer's influence inside the Armed Forces and eventually ended what had been regarded as a hidden struggle for power between himself and Nasser, in the latter's favour. It was Nasser who closely supervised the new military command as it took on responsibility for rebuilding the Armed Forces.

Main Factors of Change

The two internal factors identified in this study were the internal conflict and the time factor. The Israelis and the Soviets were the two external elements.

With the completion of the Armed Forces' reconstruction plan (1970-1971), Egypt's air defence component became the most viable combat element in the event of hostilities, regardless of the initiator. The evolution of the air defence strategy can be seen as stemming from the
emergence of a new reality in the Egyptian force structure (adequate static air defence, weak air force) by the end of that period (1970). This process of change was not premeditated, but rather came about as a result of a gradual drift or trend. Egypt was drawn to this change by the combined effect of the aforementioned indigenous and exogenous factors, with internal factors having greater influence. The interaction of these factors resulted in a significant change in Egypt's force structure and consequently, in its military capability, leaving Egypt a limited range of military strategies to choose from.

Starting with the first internal factor, the new Army command, in waging a battle to bring the Air Force under its total command, and to separating air defence from Air Force control, took advantage of the negative image of the Air Force in Egyptian society and the military establishment after 1967 - a view also shared by Nasser. The impact of the Army victory was twofold. It led to the dismissal of a considerable number of experienced senior Air Force officers, making Egypt's problem of pilot shortage even worse, and to the establishment of a favourable environment for the rapid development and expansion of the new Air Defence Force as more resources were allocated to it.

The Egyptian decision to establish a separate Air Defence Command immediately after the 1967 War lacked credibility: it was not founded on the previous success of the air defence but rather initiated for bureaucratic reasons. By establishing this command with its own staff and various departments, the Egyptian ability to absorb more defensive weapons was increased, with the result that by the end of the
reconstruction plan, a new imbalance in the Egyptian force structure in favour of the defensive had emerged.

Pressured by time, the second internal factor, the Egyptians drew up plans to reconstruct their forces in a balanced manner in a short period of time (three years). Moreover, the Egyptian leadership, though well aware that the Armed Forces' reconstruction programme would not be completed before the end of 1970, was extremely anxious to resume fighting in order to restore Egyptian morale in general, and that of the Armed Forces in particular. To achieve both aims, Egypt chose a limited strategy of confrontation, embodied in the War of Attrition launched at the end of 1968.

The Egyptian political and military command overlooked the real problems facing the implementation of the Air Force reconstruction plan; specifically, the production of 600 new fighter pilots in only three years. To find the needed number of instructors would have converted the whole Air Force into a training unit; under Egypt's circumstances, this would have been impossible. An equally crucial factor ignored by those who devised the Air Force plan concerned the human constraints in training young Egyptians to fly modern aircraft with highly sophisticated technology: poor health conditions, low educational standards and lack of personal flying aptitude.

Under the pressure of time, the Egyptians focused on air defence. Air defence weapons of low or medium technology level broadly suited the average Egyptian operator, with the result that training on these
systems did not take too long. This enabled the Egyptians to recruit a large number of air defence personnel and form many new units in a short time, far exceeding the planned size for the Air Defence, set originally in the reconstruction programme.

The Egyptian decision to start the War of Attrition brought about the external factor of the Israeli response to the Egyptian process of change in strategy. In contrast to Egyptian calculations of what the Israeli response would be to the war, Israel introduced its Air Force fully. During the War of Attrition, with their Air Force still unable to challenge the IAF, the Egyptians decided to keep investing in air defence despite huge losses. The Israelis' tactic of conducting raids against dispersed and in-depth targets forced the Egyptians to seek additional air defences to cover more targets in the country, leading to air defence expansion. For its part, deprived of the chance to develop its ability to meet the IAF in the air, the Egyptian Air Force developed hit-and-run tactics for surprise ground attacks as the only role it was capable of playing. In addition, the Israeli response of introducing its Air Force not only inflicted heavy losses on the EAF, it also restricted training programmes, with the result that the EAF was not able to achieve its development objectives.

The Israeli decision to strike deep into Egypt brought about a turning point in Egyptian military thinking. In order to deter Israel from proceeding with the in-depth raids, the Egyptian leadership decided to call in Soviet military intervention. The Israeli decision to escalate the war was responsible for establishing the conditions
for that intervention through which Egypt almost doubled its SAM weapons and managed to construct the SAM box.

Turning to the Soviet role in influencing the process of change, the Soviet policy of limited introduction of weapons to Egypt was in part dictated by Soviet fears of a hasty Egyptian decision to go to war. At the beginning of, and during, the Army-Air Force dispute, the Soviets supported the idea of establishing an air defence command. This was followed by providing Egypt with large quantities of air defence weapons. In addition, the Soviets, through their weapon supply policy, structured the Egyptian Air Force in a defensive manner. This structure was in part influenced by the nature and quality of Soviet weapons. Due to its historical experience, doctrines and technology, the USSR did not at the time produce long-range tactical attack aircraft similar to those produced in the west. Most of the aircraft in the Soviet tactical air inventory were defensive (MiG-21, MiG-17) and all (including Su-7) had short ranges with low payloads. This fact compelled the Egyptians to accept that the role of their Air Force would be limited to the defence with the ability to launch only shallow interdiction missions. Moreover, lacking combat experience, and being too methodical, the Soviet advisers did not help in building up the spirit of aggressiveness needed for the Air Force.

It is clear that the two major Egyptian decisions — establishing the Air Defence Command and starting the War of Attrition — were decisive in bringing about the involvement of the other two external factors, and therefore they had greater relative impact on the process of change. In the first instance, the establishment of the Air Defence Command with its rapid expansion convinced Nasser of its ability to protect Egypt's sky, and therefore influenced his decision to start the War of Attrition. Had the Egyptians not established a separate air defence command, the Soviets would not have been encouraged and justified in their arms supply policy of providing Egypt with defensive weapons. Had the Egyptians not taken this decision and the Soviets been adamant in their arms supply policy, the Egyptians would not have started the War of Attrition before rebuilding a balanced strength.

Similarly, the Egyptian decision to start the War of Attrition opened the door for the Israeli role, the effect of which was not clearly perceived by the Egyptian leadership when taking the decision. In any case, had the Egyptian command not started the War of Attrition, the Israelis would not have intervened in the process and the Soviet military intervention would not have taken place in the manner it did, both of which further deepened the imbalance in the Egyptian force structure.
However, although the internal factors initiated the conditions for the involvement of the external factors, all factors were essential ingredients in the process. Without the presence of the four factors, the outcome would have been different. Had the Israelis reacted differently to the War of Attrition, Egyptian military thinking and practice would have developed in a different way and the Soviets would have not intervened. Had the Soviet policies towards Egypt been different and their actual combat involvement taken a different form, the Egyptians would not have been allowed the opportunity to be convinced of the military value of the air defence, and might not, therefore, have changed their strategy in the same way.

All factors were inter-dependent, as each one was either partly influenced or directly prompted by another. Each factor triggered a chain of reactions affecting other factors and the relationships among them, thus creating a new situation which in turn reflected back on the original factor and its relationship with the other factors. The pattern here was so complicated that attempting a graphic illustration would be even more confusing.

In summary, the interaction of these different factors can be described as follows:
1. The internal conflict with its results, including the establishment of a separate air defence command: a) encouraged Nasser to resume operations with Israel, b) weakened the Air Force, c) created a suitable environment for the expansion in air defence, d) suited and legitimizied the Soviet defensive arms-supply policy.
2. The **time factor**, including the Egyptian decision to start the War of Attrition: a) prompted the Israeli response, b) encouraged rapid development in air defences, c) forced the Air Force to fight before it was ready, d) invited more Soviet involvement.

3. The **Israeli response to the War of Attrition**: a) inflicted more losses and restricted the training of the EAF, b) forced the Egyptians to expand more in air defences, c) prompted the Soviet military intervention in 1970.

4. The **Soviets**: a) supported the establishment of a separate air defence command, b) structured the Egyptian forces in a defensive manner, c) introduced large quantities of new air defence systems during their intervention in 1970, d) with the Egyptians, established the SAM-box.

**The Decision for the Final Shift**

By the end of the three-year reconstruction plan of 1967-1970, a new reality in the structure of the Egyptian Armed Forces was established. Egypt now found itself with a new structural imbalance. The composition of the huge Egyptian Army was such that it lacked mobility and was not suitable, therefore, for mobile war. Conversely, with its infantry predominance the Army was suitable for defensive operations, especially as it had the advantage over the Israelis in artillery and anti-tank weapons. Most important though, was that the Egyptians had the large infantry elements needed to make the initial crossing of the Suez Canal over a wide front, an important element of success.
Egypt's strongest arm now, however, was its huge air defence system. The air defence, once under the command of the Air Force but autonomous since 1968, had grown in three years to include 75,000 men. Although this force was largely static and was vulnerable to ECM, it provided air cover for ground forces at the front. In contrast, the EAF was still weak as it suffered from structural limitations and pilot shortages. As a result of the limitations of the MiG-21 and lack of pilot experience in the interceptor role, the EAF was still in no position to fight for air superiority. The structure of the ground attack force allowed limited attack capability, but the absence of a deep strike capability prevented the EAF from posing a real threat to the IAF's main bases in Israel proper. And finally, the structure of the Egyptian Navy and its need for air protection dictated a limited operational use, as Israeli air superiority would neutralize it.

This new reality was neither recognized nor accepted by top senior officers until after the War of Attrition, when plans were being laid for the 1973 War. In 1967-1971, the Egyptian military command maintained that the internal balance and structure of Egyptian forces, if not their size, were quite adequate for the objective of total liberation of Egyptian occupied land. It was in 1971 when Sadat ordered his Army commanders to prepare for war that the Egyptian military command started to recognize the imbalance in the structure of Egyptian forces, but they refused to accept it. This led to a new conflict within the Egyptian military command between the old tradition-oriented officers, who called for changing the means before
launching war, and the new pragmatic officers, who called for changing the objectives to suit the available means.

Sadat, as Supreme Commander and under pressure to resort to the military option, opted to support a change in military strategy instead of waiting a longer time to address the problems of force imbalance. Although at the beginning of his presidency Sadat himself appeared to be a traditionalist (calling for the total liberation of the occupied land), his shift to support the pragmatists was not surprising. Headed by C-in-C General Sadek, the traditionalists failed to appreciate Sadat's position and strong motives to start a war, insisting instead on addressing the deficiencies before deciding on battle. In contrast, taking advantage of the available means, the pragmatists envisaged a limited war based on their stronger arm - air defence. Thus, they offered a practical solution (a theory of how to win the war), regardless of how limited it was, which appeared realistic enough to produce Sadat's desired results.

The Air Defence Strategy in 1973: An Evaluation

The basic assumption of the Egyptian air defence strategy in 1973 was that the Egyptian air defence was capable of neutralizing the IAF; the SAM-box especially could provide air cover for the ground forces within its coverage. The two main principles of this strategy were: limited use of the EAF, and no ground operations outside the SAM umbrella.
In the event, Egyptian ground forces were able to cross the Canal under cover of their SAMs, at a time when Israel was taken by surprise and the IAF could not prevent the crossing. At first the IAF was not able to cope with the missile threat and had to be kept away. However, taking advantage of the Egyptian mistake of committing their strategic reserve, the Israeli Army was able to cross to the west bank of the Suez Canal and to start attacking air defence sites, and so opened the way for Air Force attacks. Without an Israeli ground operation, the IAF on its own would not have been able to open that gap. So the Egyptian assumption that air defence would provide air cover held true until a gap was found. The Egyptians themselves departed voluntarily from their strategy by ignoring their own basic guideline not to venture outside their SAM cover, as they did in the attack of 14 October. The Israeli success in breaking through to the west bank, moreover, forced the EAF to come out for air battle with the IAF and so imposed on the Egyptians a significant shift from their original policy of employing the Air Force in a limited fashion only. Thus the eventual partial failure of the Egyptian air defence strategy was due to errors in implementation at subsequent stages rather than to inherent flaws.

Although the Egyptian air defence strategy, under special circumstances, had worked for the Egyptians, enabling them to achieve their objectives of crossing the Suez Canal, this strategy, nonetheless had two main vulnerabilities, one technical and the other tactical. Because air defence depends to a large degree on electronic equipment, which can be neutralized by active ECM, the opponent will
always try to control the electromagnetic spectrum. This was true in the 1973 War, which later spurred interest in ECM and standoff missiles following their effective use during combat (the practical lessons learned by the Israelis were demonstrated in the clash with the Syrian Air Force in 1982).

The main tactical vulnerability of air defence strategies is that by their defensive nature the initiative in the air is automatically conceded to the opponent. Similarly, operations on the ground have to be kept within the air defence coverage, thereafter leaving the military initiative to the opponent. The 1973 War experience shows that the Israelis took advantage of both vulnerabilities. They had even more success on the tactical level; switching forces from the Syrian to the Sinai front, where they waited for an Egyptian mistake before launching their major counter-offensive across the Canal.

Another tactical disadvantage of air defence strategies is that of the lack of mobility in defensive systems. The high flexibility inherent in air power gives it the advantage of concentrating fire on a required point quickly, and switching rapidly to another. This advantage enables air power to outflank air defences and impose their dispersal. In the 1973 War, despite the dense deployment of air defences on both fronts, the IAF was able to outflank these air defence belts and carry out deep interdiction missions, especially on the Syrian front.
Finally, although events in the Middle East indicate that war between Egypt and Israel has become less likely, it nevertheless seems doubtful that the same strategy that was followed by Egypt in 1973 would be repeated in a future war with Israel. This is not only because the battleground has changed - the Egyptians do not have to start operations by crossing the Suez Canal - but also because of the technical and tactical lessons learned by the Egyptians from the 1973 experience. Marshal Abu-Gazala, the former Defence Minister and the present Vice-President of Egypt, asserts that Egypt would have to fight actively for air superiority, at least to achieve local air superiority in a future war. Abu-Gazala's claim coincides with the recent acquisition of more offensive aircraft by the Egyptian Air Force. (1)
References

1. For example, in 1989, Egypt had 517 combat aircraft including; 70 Mirage 5s (E and E2), 33 F-4Es, 128 Chs (J-6 and J-7), 15 Alpha Jets, 30 MiG-17s, 83 MiG-21s, 67 F-16s (A and C), 16 Mirages 2000C. The Military Balance, 1989-1990, p. 99.
APPENDIX ONE(1)

AIRCRAFT(2)

Western Systems

1. S.O. 4050 Vautour (FRANCE)

Type: Multi-role military aircraft (single-seat tactical fighter, two-seat bomber version and two-seat all weather fighter version) FF: (ptt) 16 October 1952 Data: Power plant: Two SNECMA Atar 101 E-3 axial flow turbojet engines, each of 3,500 kg (7,700 Ib) st Wing span approx: 15 m (50 ft) Length approx: 15 m (50 ft) Height approx: 4.5 m (15 ft) Weight empty: 10,000 kg (22,000 Ib) Weight loaded approx: 15,000-20,000 kg (33,000-44,000 Ib) according to role Max speed: 1,100 km/h (680 mp/h) Rate of climb at sea level: 3,600 m/min (11,800 ft/min) Service ceiling: Over 15,000 m (49,200 ft) Armament: (tactical support) Four 30 mm DEFA guns mounted in the fuselage nose, each with 100 rounds of ammunition. Up to 240 SNEB rockets in fuselage bomb-bay. Under-wing pylons for two drop fuel tanks or four Matra M.116E 'honey comb' packs each containing 19 rockets or four Matra 5103 air-to-air missiles. Automatic search and tracking fire-control radar, suitable for use with guns, rockets or guided missiles. (bomber) Similar to tactical support aircraft, but without guns. Transparent nose for bomb-aimer.

2. Dassault M.D. 450 Ouragan (France)

Type: Fighter and fighter interceptor aircraft FF: 28 February 1949 Data: Engine: One 22.67 kN (5,100 lb st) Hispano-Suiza-built Rolls-
Royce Nene 104/105 turbojet Wing span: 13.16 m (43 ft 2 in) Length: 10.74 m (35 ft 3 in) Max T-O weight: 6,800 kg (14,991 lb) Max level speed: 940 km/h (584 mph) Armament: Four 20 mm cannon; provision for 16 rockets or bombs under-wings.

3. Dassault Mystere IV And Super Mystere (France)
Type: Fighter-bomber aircraft FF: 28 September 1952. The initial series of 50 IV A aircraft had 27.9 kN (6,280 lb st) Hispano-Suiza Tay turbojet engines, while subsequent aircraft had a 34.25 kN (7,700 lb st) Hispano-Suiza Verdon 350 turbojet. The Super-Mystere was a successor to the Mystere IV A, with a thinner, more sharply swept (45 degrees as opposed to 38 degrees) wing, improved air intake and better cockpit visibility. The prototype B-1, fitted with a Rolls-Royce Avon RA.7 engine with afterburner, was flown at Mach 1 in level flight on its fourth test on 3 March 1955. Data (Super-Mystere B-2): Engine: One 43.1 kN (9,700 lb st) SNECMA Atar 101 G turbojet Wing span: 10.51 m (34 ft 5/11 in) Length: 14.04 m (46 ft 1 in) Max T-O weight: 10,000 kg (22,046 lb) Max level speed: 1,195 km/h (743 mph) Range: 965 km (600 miles) Armament: Two 30 mm DEFA cannon and a pack of air-to-air rockets in fuselage; underwing loads of up to 38 rockets in two packs, or two 500 kg bombs, two napalm tanks, 12 air-to-surface rockets or two Matra air-to-air guided missiles.

4. Potez-Air Fouga C.M.170 'Magister' (France)
Type: Two-seat trainer FF: 23 July 1952 Data: Engine: Two Turbomeca Marbore 11A turbojets each rated at 400 kg thrust Wing span: 11.30 m Length: 10.20 m Height: 2.80 m Wing area: 17.59 m Weight empty: 2150
kg Max level speed: 648 km/h Ferry range: 1180 km Service ceiling: 11,000 m.

5. Dassault-Breguet 'Mirage' III (France)
Type: Single-seat fighter and strike-fighter FF: (prototype) (ptt) 17 November 1956; (Mirage III C) 9 October 1960 Data (Mirage III C):
Power plant: One SNECMA Atar 09 B turbojet rated at 420/6000 kg thrust
Wing span: 8.22 m Length: 13.85 m Height: 4.20 m Wing area: 34.85 sq m
Weight empty: 6370 kg Weight max: 11800 kg Max level speed: 1490 km/h (Mach 1.22) Radius of action: 290-770 km Ferry range: 2300 km Time to 11,000 m: 6 min 30 sec Service ceiling: 16,500 m Armament: Two 30 mm DEFA 552 cannon with 125 rpg and (as fighter) two AIM-9 Sidewinder air-to-air missiles (AAM) and one Matra R.530 AAM or (as strike-fighter) max 1800 kg weapon load.

6. McDonnell Douglas A-4F 'Skyhawk' (USA)
Type: Single-seat shipboard strike-fighter FF: (ptt) 22 June 1954; (A-4F) 31 August 1966 Data: Power plant: One Pratt & Whitney J52-P-8A turbojet rated at 4218 kg thrust Wing span: 8.38 m Length: 12.22 m Height: 4.57 m Wing area: 24.16 sq m Weight empty: 4535 kg Weight max: 11,113 kg Max level speed: 1086 km/h (Mach 0.88) Radius of action: 550 km Ferry range: 3920 km Service ceiling: 12,880 m Armament: Two 20 mm MK.12 cannon with 100 rpg and max 3720 kg weapon load, e.g. 2 Bullpup ASMs or bombs and rockets.

7. McDonnell Douglas F-4E 'Phantom II' (USA)
Type: Two-seat fighter and strike-fighter FF: (F-4E) 30 June 1967 Data:
Power plant: Two General Electric J-79-GE-17A turbojets each rated at 5044/8127 kg thrust Wing span: 11.68 m Length: 19.20 m Height: 5 m Wing area: 49.24 sq m Weight empty: 13,770 kg Weight max: 28,055 kg Max speed: (at 300 m) 1464 km/h (Mach 1.2) Radius of action: 250-1060 km Ferry range: 2593 km Initial rate of climb: 152 m/sec Service ceiling: 8,907 m Armament: One 20 mm M-61A1 cannon with 639 rpg and (as fighter) four to six AIM-7E Sparrow 111B and four AIM-9 Sidewinder AAMs or (as strike-fighter) max 7257 kg weapon load.

8. Lightning (UK)

Type: Single-seat supersonic all-weather interceptor, strike and reconnaissance aircraft FF: (F. MK 1) 29 October 1959; built in 13 versions. Date: (T. MK 55) export version of T. MK 5 for Saudi Arabia and Kuwait. The following details apply to the Lightning F. MK 55, but are generally applicable to other late versions, for which similar data are classified. Power plant: Two Rolls-Royce Avon 302-C turbojet engines each rated at 16,300 Ib (7,393 kg st with reheat) Wing span: 34 ft 10 in (10.61 m) Length: 55 ft 3 in (16.84 m) Height: 19 ft 7 in (5.97 m) Tailplane span: 14 ft 6 in (4.42 m) Max level speed at operational height: above Mach 2 Time to operational height and speed of Mach 0.9: (clean condition) 2 min 30 sec Acceleration from Mach 1 to Mach 2: (clean condition) 3 min 30 sec Armament: Two 30 mm Aden guns with 120 rpg. Forward weapon bay capable of accommodating any one of a variety of operational pack. These include a twin-Firestreak or twin-Red Top air-to-air missile pack, a rocket pack with two retractable launchers for a total of 44 times 2-in spin-stabilised rockets. Two pylons beneath outer wings, each capable of carrying two
1,000 Ib (454 kg) bombs, two Matra 155 launchers for 18 SNEB 68 mm rockets apiece, two flare pods or two machine-gun pods. Two further pylons above inner wings, each carrying one 1,000 Ib bombs, one Matra 155 launcher, two Matra launchers (each with 18 SNEB rockets). Total possible over-and under-wing loads of 144 rockets or six 1,000 Ib bombs.

9. Jaguar (UK and France)

Type: Supersonic strike fighter/trainer (single-seat, tactical support aircraft Jaguar A and S, and two-seat operational or advanced trainer Jaguar B and E) FF(ptt): 29 March 1969 Power plant: Two Rolls-Royce/turbomeca adour turbofan engines (each 5,115 Ib; 2,320 kg st dry, and 7,304 Ib; 3,313 kg st with after burner) T-O weight normal: 24,000 Ib (11,000 kg) Max T-o weight: 34,000 Ib (15,500 kg) Wing span: 28 ft 6 in (8.69 m) Length: A and S 50 ft 11 in (15.52 m) B and E 53 ft 11 in (16.42 m) Height: 16 ft 1 in (4.53 m) Wing area: 258.33 sq ft (24.00 sq m) Max level speed at S/L: 840 mph; 1,350 km/h (Mach 1.1) Max level speed: at 36,000 ft (11,000 m) 990 mph; 1,593 km/h (Mach 1.5) Typical attack radius: internal fuel only -hi-lo-hi- 507 miles; 815 km Ferry range: with external fuel 2,614 miles; 4,210 km Armament: Two 30 mm cannon (Aden or DEFA 553). One stores attachment point on fuselage centreline and two under each wing. Provision for wingtip attachments for air-to-air missiles. Centreline and inboard wing points, each can carry up to 2,000 Ib (1,000 kg) of weapons, and the outboard underwing points up to 1,000 Ib (500 kg) each. Max external weapon load 10,000 Ib (4,500 kg).
Eastern systems

10. Ilyushin IL-28 (USSR)
Type: Three-seat light bomber FF: (ptt) 8 August 1948 Data: Power plant: Two Klimov VK-1 turbojets each rated at 2700 kg thrust Wing span: 21.45 m Length: 17.65 m Height: 6.20 m Wing area: 60.80 sq m Weight empty: 12,890 kg Max level speed: 800 km/h Radius of action: 950 km Ferry range: 3450 km Service ceiling: 12,300 m Armament: Two 23 mm NR-23 cannon with 85 rpg in nose and two 23 mm NR-23 cannon with 225 rpg in tail position, max 2000 kg weapon load, e.g. bombs, torpedoes, mines.

11. Mikoyan-Gurevich MiG-15 (USSR)
Type: Single-seat strike-fighter and two-seat trainer FF: (ptt) 30 December 1947 Data: (MiG-15 UTI) Power plant: One RD-45F turbojet rated at 2270 kg thrust Wing span: 10.10 m Length: 10.08 m Height: 3.70 m Wing area: 20.70 sq m Weight empty: 4,000 kg Max level speed: 1015 km/h Ferry range: (with two 250 ltr auxiliary tanks) 1340 km Service ceiling: 14,825 m Armament: One 12.7 mm UBK-E machine-gun with 15 rpg, one 23 mm NR-23 cannon with 80 rpg, two 100 kg bombs.

12. Yak (USSR)
Type: Basic and advanced trainer aircraft FF: (Yak-11) 1946 Data: (Yak-18) Engine: 160 hp M-11FR at 2,050 rpm Wing span: 10.6 m (34 ft 9¾ in) Length: 8.072 m (26 ft 6 in) Wing area: 16.9 sq m (181.8 sq ft) Weight empty: 816 kg (1,799 lb) Fuel: 112 kg (247 lb) Weight loaded: 1,120 kg (2,469 lb) Max speed at sea level: 248 km/h (154 mph) Range:
1,015 km (631 miles) Climb to 4,000 m (13,120 ft): 37 min Service ceiling: 4,000 m (13,120 ft).

13. Mikoyan-Gurevich MiG-17 (USSR)
Type: Single-seat fighter and strike-fighter FF: (ptt) January 150 Data (MiG-17 F): Power plant: One Klimov VK-1A turbojet rated at 2700/3200 kg thrust Wing span: 9.63 m Length: 11.26 m Height: 3.80 m Wing area: 22.60 sq m Weight empty: 3930 kg Weight max: 6075 kg Max level speed: 1125 km/h (Mach 0.92) Radius of action: 580 km Ferry range: 1980 km Armament: Three 23 mm NR-23 cannon, two 250 kg bombs or four rocket launchers each with eight 55 mm rockets or four rockets.

14. Mikoyan MiG-21 (USSR)
Type: Single-seat fighter and strike-fighter FF: (ptt) 1955 Data: (MiG-21F) Power plant: One Tumansky R-11 turbojet rated at 4500/5750 kg thrust Wing span: 7.15 m Length: 13.46 m Height: 4.10 m Wing area: 23.00 sq m Weight empty: 5450 kg Weight max: 7750 kg Max speed: (at 11,000 m) 2120 km/h (Mach 2.0) Radius of action: 350-600 km Ferry range: 1850 km Time to 12,000 m: 4 min 30 sec Initial rate of climb: 150.0 m/sec Service ceiling: 14,000 m Armament: One 30 mm NR-30 cannon and two Atoll air-to-air missiles or two rocket launchers each with nineteen 55 mm rockets or two 250 kg bombs.

15. Sukhoi Su-7 (USSR)
Type: Single-seat strike-fighter FF: (ptt) 1955 Data: (Su-7BM) Power plant: One Lyulka AL-7F-1 turbojet rated at 6440/10,000 kg thrust Wing span: 8.93 m Length: 17.00 m Height: 4.70 m Wing area: 31.60 sq m
Weight empty: 8620 kg  Weight max: 13,425 kg  Max speed: (at 300 m) 1160
km/h (Mach .95)  Radius of action: 250-400 km  Ferry range: 1450 km
Service ceiling: 15,000 m  Armament: Two 30 mm NR-30 cannon with 70 rpg
and max 1,000 kg weapon load on 4 hard points, e.g. two 500 kg or 250
kg bombs and 2 rocket launchers each with sixteen 55 mm rockets.

16. Sukhoi Su-17/20/22 (USSR)
Type: Single-seat strike fighter  FF: (ptt) 1966  Data: (Su-20, 22 export
version of Su-17M with simplified electronics)  Power plant: One Lyulka
AL-21F-3 turbojet rated at 7800/11,200 kg thrust  Wing span: 13.70/9.90
m (spread/fully swept)  Length: 4.70 m  Height: 4.70 m  Wing area: 38.00
sq m  Weight empty: 9.000 kg  Weight max: 17,000 kg  Max level speed:
1300 km/h (Mach 1.05)  Radius of action: 415-600 km  Ferry range: 1760
km  Time to 11,000 m: 12 min  Initial rate of climb: 150 m/sec  Service
ceiling: 12,250 m  Armament: Two 30 mm NR-30 cannon with 70 rpg and max
3,500 kg weapon load, e.g. two 750 kg bombs and four 500 kg bombs or
two rocket launchers each with sixteen 55 mm or 160 mm rockets or four
240 mm rockets or two Kerry air-to-surface missiles or (SU-22 as
fighter only) two Atoll air-to-air missiles.

17. Tupolev Tu-16 (USSR)
Type: Medium bomber and reconnaissance aircraft, 5-7 crew  FF: (ptt)
1954 Data: (Tu-16A)  Power plant: Two Mikulin AM-3M turbojets each rated
at 8750 kg thrust  Wing span: 34.50 m  Length: 36.50 m  Height: 10.80 m
Wing area: 170.00 sq m  Weight empty: 40,000 kg  Weight max: 72,000 kg
Max speed: (at 11,000 m) 925 km/h (Mach 0.87)  Range: (with 4,000 kg
weapon load) 4,800 km, (with two Kelt air-to-surface missiles) 3240 km
Ferry range: 5750 km Service ceiling: 12,200 m Armament: Six 23 mm cannon in 3 turrets, one fixed 23 mm cannon in fuselage and (Tu-16A) max 6,000 kg weapon load (e.g. bombs) or (Tu-16B) two underwing air-to-surface missiles (Kennel) or (Tu-16C) one ASM (Kipper) under the fuselage or (Tu-16G) two Kelt or Kingfish ASMs underwing.

18. Aero L-29 'Delfin' (Czechoslovakia)

Type: Two-seat trainer FF: (ptt) 5 April 1959 Data: Power plant: One Motorlet M-701 turbojet rated at 890 kg thrust Wing span: 10.29 m Length: 10.81 m Height: 3.13 m Wing area: 19.80 sq m Weight empty: 2280 kg Weight max: 3540 kg Max level speed: 610 km/h Ferry range: 895 km Time to 6100 m: 12 min Initial rate of climb: 14.0 m/sec Service ceiling: 11,000 m Armament: Two 100 kg bombs or 4 rockets or two 7.62 mm machine-guns in underwing pods.
### AIR DEFENCE WEAPONS(3)

**Soviet Anti-Aircraft Artillery**

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<td>Fire control</td>
<td>ZAPP-4 mechanical computing</td>
<td>AZP-37 sights optical-mechanical</td>
</tr>
<tr>
<td>Rate of fire</td>
<td>600 rpm</td>
<td>180 rpm</td>
</tr>
<tr>
<td>Max horizontal range</td>
<td>7 km</td>
<td>8 km</td>
</tr>
<tr>
<td>Max altitude</td>
<td>5 km</td>
<td>6 km</td>
</tr>
<tr>
<td>Effective range</td>
<td>1.4 km</td>
<td>3 km</td>
</tr>
<tr>
<td>Ammunition types</td>
<td>AP-1, APT-T, AP-T, HEI Frag-HE, AP-T, HVAP</td>
<td></td>
</tr>
<tr>
<td>Crew</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Mount</td>
<td>4-wheel, 2 axle trailer as 14.5 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Soviet Anti-Aircraft Artillery</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>57 mm</td>
<td>85 mm</td>
</tr>
<tr>
<td><strong>Soviet designation</strong></td>
<td>S60</td>
<td>KS-12</td>
</tr>
<tr>
<td><strong>Nato model number</strong></td>
<td>M 1939</td>
<td></td>
</tr>
<tr>
<td><strong>Year introduced</strong></td>
<td>1945</td>
<td>1939</td>
</tr>
<tr>
<td><strong>Calibre</strong></td>
<td>71 cal</td>
<td>55 cal</td>
</tr>
<tr>
<td><strong>Weight (firing)</strong></td>
<td>4,600 kg</td>
<td>4,986 kg</td>
</tr>
<tr>
<td><strong>Length (travelling)</strong></td>
<td>8.5 m</td>
<td>7.049 m</td>
</tr>
<tr>
<td><strong>Height (travelling)</strong></td>
<td>2.37 m</td>
<td>2.230 m</td>
</tr>
<tr>
<td><strong>Width (travelling)</strong></td>
<td>2.05 m</td>
<td>2.250 m</td>
</tr>
<tr>
<td><strong>Track</strong></td>
<td></td>
<td>1.8 m</td>
</tr>
<tr>
<td><strong>Elevation rate</strong></td>
<td></td>
<td>8 deg/sec</td>
</tr>
<tr>
<td><strong>Elevation limits</strong></td>
<td>-4 deg/+87 deg</td>
<td>-5 deg/+82 deg</td>
</tr>
<tr>
<td>** Traverse rate**</td>
<td></td>
<td>12 deg/sec</td>
</tr>
<tr>
<td><strong>Fire control</strong></td>
<td>radar</td>
<td>radar (SON 9A)</td>
</tr>
<tr>
<td><strong>Rate of fire</strong></td>
<td>105-120 rpm</td>
<td>10-15 rpm</td>
</tr>
<tr>
<td><strong>Max horizontal range</strong></td>
<td>12.0 km</td>
<td>12 km</td>
</tr>
<tr>
<td><strong>Max altitude</strong></td>
<td>8.8 km</td>
<td>9.6 km</td>
</tr>
<tr>
<td><strong>Effective range</strong></td>
<td>6 km</td>
<td>8.38 m</td>
</tr>
<tr>
<td><strong>Ammunition types</strong></td>
<td>OR-281 HE/HEI, BR-281 APC/API</td>
<td>Frag-HE, APHE, HVAP, smoke</td>
</tr>
<tr>
<td><strong>Crew</strong></td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td><strong>Mount</strong></td>
<td>4-wheel outrigger</td>
<td>4-wheel cross</td>
</tr>
<tr>
<td>Description</td>
<td>Specification</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>100 mm</td>
<td></td>
</tr>
<tr>
<td>Soviet designation</td>
<td>KS-19 M2</td>
<td></td>
</tr>
<tr>
<td>Nato model number</td>
<td>M-1949</td>
<td></td>
</tr>
<tr>
<td>Year introduced</td>
<td>1949</td>
<td></td>
</tr>
<tr>
<td>Calibre</td>
<td>56 cal</td>
<td></td>
</tr>
<tr>
<td>Weight (firing)</td>
<td>11,000 kg</td>
<td></td>
</tr>
<tr>
<td>Length (travelling)</td>
<td>9.238 m</td>
<td></td>
</tr>
<tr>
<td>Height (travelling)</td>
<td>2.201 m</td>
<td></td>
</tr>
<tr>
<td>Width (travelling)</td>
<td>2.286 m</td>
<td></td>
</tr>
<tr>
<td>Track</td>
<td>2.165 m</td>
<td></td>
</tr>
<tr>
<td>Elevation rate</td>
<td>9 deg/sec</td>
<td></td>
</tr>
<tr>
<td>Elevation limits</td>
<td>-3 deg/+85 deg</td>
<td></td>
</tr>
<tr>
<td>Traverse rate</td>
<td>18 deg/sec</td>
<td></td>
</tr>
<tr>
<td>Fire control</td>
<td>radar (SON-9A)</td>
<td></td>
</tr>
<tr>
<td>Rate of fire</td>
<td>15-20 rpm</td>
<td></td>
</tr>
<tr>
<td>Max horizontal range</td>
<td>21 km</td>
<td></td>
</tr>
<tr>
<td>Max altitude</td>
<td>14.5 km</td>
<td></td>
</tr>
<tr>
<td>Effective range</td>
<td>11.9 km</td>
<td></td>
</tr>
<tr>
<td>Ammunition types</td>
<td>Frag-HE, APHE</td>
<td></td>
</tr>
<tr>
<td>Shell weight</td>
<td>HE-15.7 kg, APHE-15.9kg</td>
<td></td>
</tr>
<tr>
<td>Crew</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Mount</td>
<td>4-wheel cross</td>
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</table>
### ZSU-23-4 and ZSU-23-4 Anti-Aircraft Guns

<table>
<thead>
<tr>
<th><strong>ZSU-23-4</strong></th>
<th><strong>ZSU-23</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduced</td>
<td>1966</td>
</tr>
<tr>
<td>Weight loaded</td>
<td>14,000 kg</td>
</tr>
<tr>
<td>Length</td>
<td>6.3</td>
</tr>
<tr>
<td>Height (travelling)</td>
<td>2.3 m</td>
</tr>
<tr>
<td>Track</td>
<td>2.67 m</td>
</tr>
<tr>
<td>Ground pressure</td>
<td>0.267 kg/sq-k</td>
</tr>
<tr>
<td>Max road speed</td>
<td>45 km/h</td>
</tr>
<tr>
<td>Fuel capacity</td>
<td>250 ltr</td>
</tr>
<tr>
<td>Range</td>
<td>260 km</td>
</tr>
<tr>
<td>Vertical obstacle</td>
<td>1.1 m</td>
</tr>
<tr>
<td>Trench</td>
<td>2.8 m</td>
</tr>
<tr>
<td>Engine</td>
<td>V-6 dies</td>
</tr>
<tr>
<td>Turret rotation</td>
<td>45 deg/sec</td>
</tr>
<tr>
<td>Basic load</td>
<td>2,000 rounds</td>
</tr>
<tr>
<td></td>
<td>in 40 magazine</td>
</tr>
<tr>
<td>Crew</td>
<td>4</td>
</tr>
<tr>
<td>Soviet 'nickname'</td>
<td>'Shillka'</td>
</tr>
<tr>
<td>(unofficial)</td>
<td></td>
</tr>
</tbody>
</table>

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### Surface-to-Air Missiles

<table>
<thead>
<tr>
<th>NATO</th>
<th>SA-2 Guideline</th>
<th>SA-3 Goa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year introduced</td>
<td>1957</td>
<td>1961</td>
</tr>
<tr>
<td>Length</td>
<td>10.6 m</td>
<td>6.1 m</td>
</tr>
<tr>
<td>Diameter</td>
<td>0.5 m 1st stage, 0.66 m 2nd stage</td>
<td>0.6 m 1st stage, 0.45 m 2nd stage</td>
</tr>
<tr>
<td>Launch weight</td>
<td>2,300 kg</td>
<td>946 kg</td>
</tr>
<tr>
<td>Mount</td>
<td>single</td>
<td>double</td>
</tr>
<tr>
<td>Guidance</td>
<td>radio command</td>
<td>radio command</td>
</tr>
<tr>
<td>Control method</td>
<td>movable tail surfaces</td>
<td>movable foreplane surfaces</td>
</tr>
<tr>
<td>Fuel</td>
<td>solid 1st stage, liquid 2nd stage</td>
<td>solid fuel</td>
</tr>
<tr>
<td>Max speed</td>
<td>Mach 3</td>
<td>Mach 3.5</td>
</tr>
<tr>
<td>Max range</td>
<td>35 km</td>
<td>29 km</td>
</tr>
<tr>
<td>Min range</td>
<td>9.3 km</td>
<td>6 km</td>
</tr>
<tr>
<td>Max altitude</td>
<td>28 km</td>
<td>12.2 km</td>
</tr>
<tr>
<td>Min altitude</td>
<td>4.5</td>
<td>1.5 km</td>
</tr>
<tr>
<td>Warhead</td>
<td>130 kg, HE</td>
<td>60 kg, HE</td>
</tr>
<tr>
<td>Burst radius</td>
<td>13.5 m</td>
<td>12.5 m</td>
</tr>
<tr>
<td>Rate of fire</td>
<td>1 missile every</td>
<td>1 per min</td>
</tr>
<tr>
<td>(per launcher)</td>
<td>10-12 min</td>
<td></td>
</tr>
<tr>
<td>Normal launch angle</td>
<td>80 deg</td>
<td></td>
</tr>
<tr>
<td>Fire control radar</td>
<td>Fan Song A</td>
<td>P-15 Flat Face</td>
</tr>
</tbody>
</table>

(Data refer to basic SA-2A and SA-3A)
<table>
<thead>
<tr>
<th>NATO</th>
<th>SA-6 Gainful</th>
<th>SA-7 Grail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year introduced</td>
<td>1967</td>
<td>1966</td>
</tr>
<tr>
<td>Length</td>
<td>6.2 m</td>
<td>1.3 m</td>
</tr>
<tr>
<td>Diameter</td>
<td>0.335 m</td>
<td>0.07 m</td>
</tr>
<tr>
<td>Tail span</td>
<td>0.124 m</td>
<td></td>
</tr>
<tr>
<td>Launch weight</td>
<td>550 kg</td>
<td>9.2 kg</td>
</tr>
<tr>
<td>Mount</td>
<td>triple</td>
<td>man-carried</td>
</tr>
<tr>
<td>Guidance</td>
<td>radio command</td>
<td>infra-red homing</td>
</tr>
<tr>
<td>Terminal homing</td>
<td>semi-active radar</td>
<td></td>
</tr>
<tr>
<td>Control method</td>
<td>control surfaces</td>
<td>canard fins</td>
</tr>
<tr>
<td>Fuel</td>
<td>integral 2-stage</td>
<td>2-stage solid-fuel</td>
</tr>
<tr>
<td></td>
<td>rocket/ramjet</td>
<td></td>
</tr>
<tr>
<td>Max speed</td>
<td>Mach 2.8</td>
<td>Mach 1.5</td>
</tr>
<tr>
<td>Max range</td>
<td>30 km</td>
<td>3.5 km</td>
</tr>
<tr>
<td>Min range</td>
<td>4 km</td>
<td>45 m</td>
</tr>
<tr>
<td>Max altitude</td>
<td>18 km</td>
<td>1.5 km</td>
</tr>
<tr>
<td>Effective altitude</td>
<td>11 km</td>
<td></td>
</tr>
<tr>
<td>Min altitude</td>
<td>30 m</td>
<td>150 m</td>
</tr>
<tr>
<td>Warhead</td>
<td>80 kg (40 of which is HE)</td>
<td>1.8 kg (0.37 kg HE)</td>
</tr>
<tr>
<td>Burst radius</td>
<td>5 m</td>
<td></td>
</tr>
<tr>
<td>Rate of fire</td>
<td>1-3 missiles, ripple-fired</td>
<td></td>
</tr>
<tr>
<td>Fire control radar</td>
<td>Straight Flush</td>
<td>Soviet nickname: Strella</td>
</tr>
</tbody>
</table>

**SA-6 launch vehicle**

| Length     | 6.8 m                 | 1.346 m             |
| Width      | 2.95 m                | 0.1 m               |
Height (travelling) 3.45 m

Weight 9.2 kg

Crew 3

Soviet designation 9 P54

Other data identical to those of ZSU-23-4 vehicle.
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1. The list does not include transport and helicopter aircraft.


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