

“A 1991 Dossier on the Role of the Iraqi Air Force in the Gulf War”



Summary: This document is a dossier dated 1991 on the role of the Iraqi Air Force (IAF) in the Gulf War which includes information on an IAF mission, a description of the battlefield, and the planning, preparation, and management of the war. Additionally, there is a section on electronic warfare with conclusions and recommendations.

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Air Force and Air Defense Command

The Role of the Air Force and Air Defense
in the Mother of all Battles

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In the name of God, the Beneficent, the Merciful

“And when the true believers saw the clans, they said: This is that which God and His messenger promised us. Allah and His messenger are true. It did but confirm them in their faith and resignation.”

God Almighty has spoken the truth
“Al-Ahzab”

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Introduction

1. The political and military situation became clear after the liberation of Kuwait on August 2, 1990, and the possibilities of an aggression increased with the increase of the adversary's military mobilization in the Saudi territories, the Gulf countries, and Turkey. After an extensive study of the mission entrusted to the Air Force and Air Defense, the resources were reorganized and the necessary plans were implemented with regard to facing the adversary's air threat.
2. Prior to August 2, 1990, it was clear that the magnitude of the Air Force and Air Defense, considering the planes they possessed as well as the weapons and available systems, had the power of facing the adversarial threat of the neighboring countries, each one separately, especially Iran, and for a suitable period of time while achieving satisfactory results on this level. As for the Zionist enemy, our military logistics required that Iraq participate with the Arab countries in any potential confrontation. For this reason, our Air Force and Air Defense were assigned to confront the potential Zionist aggression by responding in the form of air attacks with a limited number of planes, targeting the strategic projects and vital targets in the Israeli depth and later on by expanding the mission, so it would include a large-scale air interception of selected targets in the adversary's depth and with all the available air power potential.
3. The resistance of our air forces in the face of the adversary's aggression, characterized by its intensity and superiority in number and technology, had a large and crucial effect in not allowing the enemy to achieve his final goals. With the available power, we were able to maneuver and fight as required by the situation and its changes, and as it will be indicated in this analysis, in which we will shed light on the efforts exerted and the results achieved in the immortal Mother of all Battles.

Purpose

4. Analysis of the role of the Air Force and Air Defense in the Mother of all Battles in confronting the aggression of the coalition countries and acquiring the lessons learned from it.

Mission of the Air Force and Air Defense in the Mother of all Battles

5. The mission of the Air Force and Air Defense includes the following:
 - A. Mission of the Air Force comprises two aspects: The first one is the mission against the coalition countries which is done by undertaking limited air interceptions, infiltration in selected targets, and supply of air support to the ground and naval forces.

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The second aspect is the mission against the Zionist enemy, which is done by undertaking an air interception for a total reprisal with all the available air power capability, including the ground attack planes to handle the maximum targets possible and to achieve a vindictive retaliation, provided that the retaliation be immediate and as soon as possible within 36 hours once the order has been issued.

- B. Mission of the air defense is to provide the air defense of the Iraqi air space and the defense of the civilian and military vital targets, strategic projects, and ground troops.

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Study plan

6. The study will include the following titles:

- A. General Situation - Description of the Battlefield - Forces of Both Parties, presented by Staff Air Force Colonel, Haytham Khattab, from the Air Intelligence Directorate.
- B. Planning of the Air Defense battle, which includes the special preparation of the Air Defense, warning and control of the Air Defense sectors, presented by Staff Air Vice Marshal, Safa' Tawfiq, Assistant to the Air Defense Commander.
- C. Management of the Air Defense battle, presented by Staff Brigadier General, Shaheen Yassin, Director of the Air Defense Movements.
- D. Air Force Battle - Planning and preparation presented by Staff Air Vice Marshal, Khaldun Khattab Bakr, Assistant to the Operations Commander.
- E. Management of the Air Force Battle, presented by Staff Air Vice Marshal, Fahd Abd-al-Baqi, Director of the Air Movements.
- F. Electronic War, presented by Staff Air Commodore, Taleb Mohammed Kadhum, Commander of the Air Force Technical Equipment.
- G. Lessons Learned, presented by me at the end of the study.

General Situation

- 7. Following the day of the Great Call [*referring to the invasion of Kuwait*] on August 2, 1990, the political and military situation began to develop with the start of the adversary's movement, which included several political, military, economic, and media measures that began with a series of statements and decisions issued by the Security Council against Iraq under the direct guidance of the American administration and with the direct assistance of the permanent members of the Security Council, especially France, Britain, and the Soviet Union.
- 8. Also began a series of political measures on the regional level in preparation for the military measures, especially the political measure related to holding the so-called Summit in Cairo on August 6, and the wicked maneuvers that occurred in it to pass the special resolution approving the dispatch of foreign forces to the Saudi territories under the pretext of defending them against any potential Iraqi invasion, knowing that the U.S. forces had begun a movement prior to the issuance of the suspicious Summit's resolutions, with a direct agreement between the U.S. administration and the Saudi King.

9. On August 2, 1990, our Air Force and Air Defense and all their potential with regard to the size of the combat planes, the available weapons and other systems, and on the basis of their deployment plans, and their readiness and operational plans, had the capability of facing the hostile threat of the neighboring countries, each country separately, especially Iran.

Description of the scene of operations

10. The scene of operations included the mobilization regions of the adversary's air forces in Saudi Arabia and each of the Arabian Gulf countries, Turkey, and the waters of the Arabian Gulf, Arabian Sea, and Red Sea. The said operations region surrounded Iraq from the south, north, and west.
11. The length of the border region between Iraq and Saudi Arabia, including Kuwait, reached 700 kilometers, and consisted of a flat desert land without any natural obstacle hindering the progress of the ground units during their advancement from Saudi Arabia in the direction of Iraq. Besides, the nature of the said border region provided a high maneuvering and interception potential, and the nature of the region procured a high capability of air and ground radar detection.

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12. There are a number of air bases in Saudi Arabia scattered at remote distances. Saudi Arabia's geographical depth helps the scattering of its air bases and airports, which provides protection to these bases and secures their spreading in regions which supply them with security against the air operations as indicated in the General Situation's map, Attachment ().
13. Iraq has a border with Turkey of approximately 300 kilometers of mountainous nature, limiting the capability of detecting the ground radar for both parties as a result of the presence of many chains of mountains with high altitudes covering all of the said border region, especially the lower exposed regions, as these mountains conceal and prevent detection at low altitudes. Therefore, the enemy will focus on the airborne radar detection.
14. The weather in Saudi Arabia and the Arabian Gulf countries is a dry and hot continental weather in summer and dusty and cold in winter, with different types of clouds forming, including the thunderous clouds. In general, the weather of the region in all seasons does not constitute an obstacle for air operations, especially since a large number of their planes are equipped to operate in all kinds of weather, particularly bad weather.
15. As a result of the flat lands characterizing the geographical nature of the border region between Iraq and Saudi Arabia, the enemy could take advantage of the potential of the early warning planes he has, which were continuously carrying out air detection duties in the sector of operations assigned to these planes, as most of the Iraqi air bases of the south, center, and western regions are within the detection capability of these planes, which overlap with the detection and guidance of the early warning planes operating in Turkey.

16. Forces of both parties

A. The enemy

First: the enemy has around 2,700 combat planes of different types all having a high combat capability. Most of these planes are characterized by a high range of operation, high loading, and a capability of carrying traditional, sophisticated, and guided weapons equipped with advanced navigational, attack, and aiming systems which provide accuracy in reaching the targets, capability of handling them in all kinds of weather, and advanced electronic war systems that could affect all of our air defense means, and therefore diminishing the enemy's losses. The enemy also has the potential of air refueling around the clock and in all types of weather. Hereunder are the number and types of hostile and combat planes:

1. 19 strategic bombing B-52 aircraft in Saudi Arabia only.
2. 215 F-16 aircraft with multiple roles, in addition to the aircraft available in the Zionist entity.

3. 219 F-15 aircraft, including approximately 60 aircraft in the Gulf countries.
4. 100 F-14 aircraft assigned to the Air Defense.
5. 200 F-18 aircraft with multiple roles.
6. 34 F-4 aircraft for electronic silencing and reconnaissance.
7. 41 F-117 (Phantom) aircraft assigned to the bombing.
8. 122 F-111 aircraft assigned to the ground attack and electronic war.
9. 140 A-10 aircraft assigned to the anti-armor combat.

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10. 122 A-6 aircraft assigned to the bombing and electronic war.
11. 84 Harrier aircraft for close air support.
12. 123 Jaguar aircraft for ground attack.
13. 90 Tornado aircraft with multiple roles.
14. 100 F-5 aircraft for ground attack.
15. 20 A-7 aircraft for ground attack.
16. 6 F-1 Mirage F-1 aircraft for reconnaissance.
17. 53 Mirage 2,000 aircraft with multiple roles.
18. Large numbers of Cruise mobile missiles.

Second: Specialized support aircraft

1. 25 AWACS E-3A aircraft in the Saudi and Turkish territories for command, control, and airborne early warning.
2. 25 Hawk E-2C aircraft operating from the aircraft carriers and ground bases for the purposes of command, control, and early warning.
3. A number of TR-1, RC-135, C-130 aircraft for electronic war, command, control, and reconnaissance.
4. A number of KC-10, KC-135 and Victor air refueling aircraft.
5. A large number of helicopters for the transport, anti-armor combat, and aiming the artillery firing.

Third: Pilots: The enemy prepared a large number of pilots exceeding 6,000 pilots with a high level of competency and in a proportion of 2:1 for each aircraft, which provided him with the potential for opening fire continuously by day and by night, in all weather, and with a satisfactory level of performance.

Fourth: The enemy intercepting force: The enemy was able to allocate around 600 of the aircraft referred to in the first article, points 3-4 for the interception of all types of F-15, F-14, F-18, and Mirage 2000 aircraft, controlled by a complete system of ground, naval, and airborne command, control and guidance, deployed at the operations field, so that they would provide the possibility of carrying out the operations of interception inside our territories and over long distances in a manner that each AWACS aircraft would perform 45 interceptions, in addition to supplying a radar detection covering approximately 400 kilometers. This meant eliminating the element of surprise for our aircraft. The enemy intercepting aircraft were characterized by a high combat capability, a long range of operation, and they were supplied with systems for detection and air-to-air weapon guidance at a distance exceeding in general the weapons' range of our intercepting aircraft.

Fifth: The combat force of the adversary anti-aircraft weapons: The enemy had the following anti-aircraft weapons available:

1. Saudi Arabia

First: 18 Hawk batteries.

Second: 16 Shaheen batteries.

Third: 6 Crotale batteries.

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Fourth: 400 30 mm Vulcan six-barreled cannons.

Fifth: 82 30 mm Vulcan dual barreled cannons.

Sixth: 3 35 mm artillery batteries.

Seventh: 200 Stinger shoulder missile launchers.

2. Coalition countries

First: A number of Patriot missile batteries.

Second: A number of Hawk missile batteries.

Third: A number of Crotale missile batteries.

Fourth: A number of Roland missile batteries.

Fifth: A number of Rapier missile batteries.

Sixth: A large number of Javelin and Stinger shoulder missile launchers.

Seventh: A number of anti-aircraft artillery batteries of different calibers.

3. The abovementioned air defense weapons were deployed to protect the facilities, vital targets, air bases, airports, units, and main cities in a way to provide a sufficient coverage of the scene of operation's regions.

Sixth: Electronic war and reconnaissance: The enemy had a very large potential in the electronic war as follows:

1. Reconnaissance: The enemy used the satellites that have different purposes for the graphic, radar, and electronic reconnaissance, in addition to the specialized TR-1, OV-10, and Mohawk and Joint Stars aircraft, assigned to the reconnaissance of the ground battlefield, ground-to-ground missile locations, and the command, control and early warning aircraft.
2. Jamming equipment: With a high technical and tactical capability and with an effective impact on the air defense system. They include the positive jamming (defensive - offensive) and the negative jamming of the guided and non-guided wireless communications by using the EA-6B and EF-111 specialized jamming combat aircraft, in addition to the RC-135 and EC-130 transport aircraft.
3. American Shrike and Harm, and British Alarm anti-radar missiles in addition to the guided planes and the delusive decoys to saturate the air defense system.
4. Effective electronic protection media for the radars of the aircraft guided weapons, in addition to the anti-aircraft weapons, ships and naval units.

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Seventh: The mobile missiles: The enemy used Cruise mobile missiles intensively, especially during the first days of the battle. These missiles were never used in any war before and were characterized by their small size, long range of operation, difficulty of detecting them by radar, and accuracy of hitting. They operate in all weather conditions, by day and by night, and are launched from the battleships and cruisers in the Arabian Gulf, Red Sea, and B-52 aircraft.

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Eighth: Concentration of aircraft: The enemy's aircraft was positioned in the south operation fields in the Saudi bases as follows:

1. Dhahran base: In which the F-15 and Tornado aircraft were mainly positioned.
2. Riyadh base: In which the AWACS, the air refueling and intercepting aircraft, especially the F-15 aircraft, were mainly positioned.
3. Taef base: In which the F- [number is missing after "F"] aircraft was positioned.
4. Khamis Mushait base: In which the F-117 Phantom aircraft was positioned.
5. Jeddah base: In which the air refueling and transport aircraft were positioned.
6. Tabuk base: In which a number of F-16 aircraft was positioned.
7. As for the airports relatively close to the borders, such as Jubail and Hafr El-Baten Airports and some other airports, the Harrier and A-10 support aircraft were positioned there. Squadrons of F-16 aircraft were positioned in the airports of the United Arab Emirates and Qatar. Squadrons of air refueling British aircraft, Jaguar aircraft, and U.S. F-16 aircraft were positioned in the airports of Bahrain. Most of the abovementioned bases were located outside the range of operation of our aircraft.
8. The enemy's naval aircraft operated aboard the aircraft carriers. Three of them (Ringer, Roosevelt and Missouri) were positioned in the Arabian Gulf region. In the Red Sea, three other aircraft carriers were positioned; they were the Saratoga, Kennedy and America, and aboard each carrier 80 A-6, F-18 and F-14 combat aircraft and Hawk Eye aircraft for command and control were positioned.
9. Most of the aircraft that participated in the attack from the Turkish territories were mainly positioned in Incirlik Base outside the range of operation of our aircraft.
10. The B-52 strategic bombardiers operated in the United States on the first day of their presence. They landed in Diego Garcia Air Base in the Indian Ocean. They also landed in some British, Egyptian, Saudi, and other countries' airports.

Ninth: Enemy's potential: Based on what was previously mentioned, the enemy could use his full air power in Saudi Arabia, the Gulf countries, the aircraft carriers, and in Turkey, with the participation of Israel, from multiple axes, in different directions, in a large number of aircraft, with different consecutive and continuous waves, for long periods of time and around the clock, in all weathers, on several targets simultaneously, by using the remote guided weapons and traditional weapons. This happened as a result of the enemy's quantitative and qualitative superiority compared to our potential, amounting to a proportion of 1:4 in favor of the enemy, when quantitatively comparing the force of the interceptors, and a proportion of 1:8 in favor of the enemy when qualitatively comparing the force of the interceptors. The coefficient of general superiority amounted to more than 1:12 in favor of the enemy when making a general comparison. His power was reinforced with advanced capabilities in the field of command, control, electronic war, air refueling, reconnaissance, use of cruise missiles, and delusive decoys.

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17. Our forces

A. Aircraft: The sophisticated air defense and ground attack aircraft were mainly adopted for the first line to face the adversary's threats, because of their good capabilities which relatively match the requirements of the modern war, in an uneven manner depending on the type of aircraft. In addition, the effective capabilities of these aircraft are considered relative to the enemy's capabilities in this field, as not all aircraft of the same type were equipped with the same equipment needed to provide the same performance capability. Also, we were unable to get sophisticated modern aircraft, especially the intercepting aircraft, due to the financial obstacles we faced prior to the aggression, in addition to the weakness of the electronic war system of our aircraft. Hereafter are the number of our squadrons and their types:

First: 4 squadrons of Mirage F-1 for the ground attack and air defense.

Second: 4 squadrons of Sukhoi-22 for the ground attack.

Third: 2 squadrons of Sukhoi-24 for the ground attack.

Fourth: 2 squadrons of Sukhoi-25 for the close support.

Fifth: 1 squadron of Sukhoi-20 for the ground attack.

Sixth: 1 squadron of MiG-23 BN for the ground attack.

Seventh: 3 squadrons of MiG-23 ML for the air defense.

Eighth: 4 squadrons of MiG-21 for the air defense.

Ninth: 2 squadrons of MiG-25 for the air defense and reconnaissance.

Tenth: 2 squadrons of MiG-29 for the air defense.

Eleventh: 1 squadron of B,D for the naval bombing and attack.

B. Pilots: The performance of our pilots progressed during the glorious battle of Qadisiyah Saddam [*the Iran-Iraq War*] and they acquired experience in carrying out their combat duties. Most of them became competent in fulfilling the duties entrusted to them. The proportion of pilots assigned to the aircraft was sufficient to perform the duties in light of the main mission of our Air Force. When comparing them with the performance of the enemy's pilots, we find that the latter had better training opportunities and enjoyed good training conditions for a long period of time, in addition to the availability of modern training requirements, with a low annual percentage of attrition. This helped build-up their experience and increase the performance difference in favor of the adversary pilot, in terms of fulfilling the complicated duties that required long training periods and the availability of appropriate training methods for the night ground attack duties, during very bad weather conditions, the night air combat, in bad weather, in electronic war conditions, and on the level of large formations.

Size of the Air Defense System

18. In addition to the intercepting aircraft referred to in article 17, our air defense system included the following anti-aircraft weapons and systems:

A. Anti-aircraft weapons:

First: 6 brigades of anti-aircraft missiles composed of 35 Pejora batteries, 20 Volga batteries assigned to protect the Baghdad region, Project/777, Project/922, the military industrialization installations in Alexandria, Al-Ameriyya and Basra and to protect the oil and electric installations in Kirkuk, the phosphate complex in Al-Qaim, in addition to the assignment of 14 batteries for the protection of the ground troops in Kuwait.

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Second: 6 Kvadrat missile battalions belonging to the field air defense for the protection of Al-Walid Base, the industrialization installations in Alexandria and Project/777. 3 of these battalions were assigned to the protection of the Republican Guard Command in Basra.

Third: 4 Roland missile battalions composed of 108 firing units were assigned to the protection of all the headquarters and the vital, military and civil projects. Besides, 4 of these batteries were assigned to the protection of the Adnan Base and the Metla' region in Kuwait.

Fourth: 20 Strela missile batteries, including 5 regional batteries, 4 Republican Guard batteries, and 11 field air defense batteries, were assigned to the defense of the vital projects as well as the ground troops in Kuwait and Basra region.

Fifth: 1 OSA missile battalion belonging to the field air defense was assigned to the protection of Project/777, and one of its batteries including 4 firing units was assigned to the protection of the Metla' region in Kuwait.

Sixth: 39 37 mm anti-aircraft battalions, including 26 regional battalions, 9 field defense battalions, and 4 Republican Guard battalions, were assigned to the protection of the vital projects, both bases of Adnan and Abbas, and the important crossroads in Kuwait.

Seventh: 36 non-guided anti-aircraft battalions, including 21 regional battalions, 13 field battalions, and 2 Republican Guard battalions.

B. Warning and control system: The warning and control system was composed as follows:

First: 4 warning and control brigades at a rate of one brigade for each air defense sector in Baghdad - Kirkuk - Al-Walid - Nasiriyyah.

Second: 14 warning and control battalions deployed in all the regions of the country to provide radar detection at high, medium, and low altitude up to 100 meters. They were composed of:

1. 60 early warning radar platoons.
 2. 22 guidance centers.
 3. 14 control companies.
 4. 16 warning companies.
 5. 25 observation companies composed of 610 visual observatories deployed with several borders and the internal surveillance lines in depth and sequentially.
- Third: One warning and control battalion and one control company were assigned from the warning and control resources to Adnan base, as well as 2 additional and original surveillance companies and 38 observatories to cover the region of Kuwait.

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Preparation for the defensive battle in the Mother of all Battles

19. When the glorious battle of Qadisiyah Saddam [*the Iran-Iraq War*] ended in victory over the Iranian enemy with the ceasefire resolution on the 8th of August 1988, the Air Defense work plan was reviewed with all its details so it would achieve the mission of protecting the headquarters and vital projects, according to their different categories as specified by the Secretariat of the National Security Council to confront, as a first priority, the Zionist air threat which targeted mainly the advanced scientific circles in Iraq. This required intensified protection of these projects, developing the plans for the tactical use of the interceptors, anti-aircraft weapon systems, warning and control systems to provide a quick and immediate response to face any Zionist air violation of our international borders, and the interception of any potential adversary air threat from other countries.

The air defense status after Al-Qadisiyah [*Iran-Iraq War*] and before the 2nd of August 1990

20. To determine the air defense mission for the air protection against the Zionist air threat as a first priority, since it was the main proclaimed threat against Iraq in light of the scientific and technological progress in some scientific circles and the military industrialization, on these grounds, the National Security Council categorized the headquarters and civil and military projects according to their degree of importance and the following priorities:

- A. 24 headquarters and strategic projects including 8 military ones.
- B. 42 very important headquarters and projects including 21 military ones.
- C. 135 important headquarters and projects including 96 military ones.

The size of Air Defense system before the 2nd of August 1990

21. The air defense system was composed as follows:

A. Guided and non-guided anti-aircraft weapons: The headquarters and vital projects' needs for protection were calculated according to the priorities set for them, in comparison with what was available in Iraq of regional anti-aircraft weapons and the anti-aircraft field weapons that could be reinforced. Plans for the deployment of these weapons were set to provide an appropriate degree of protection with the available capabilities. The total number of formations and units were as follows:

First: 6 anti-aircraft missile brigades composed of 35 Pejora firing batteries and 20 Volga firing batteries.

Second: 6 anti-aircraft Kvadrat missile battalions belonging to the field air defense.

Third: 4 Roland missile battalions composed of 108 firing units.

Fourth: 20 Strela missile batteries, including 5 regional batteries, 11 batteries belonging to the field air defense, and 4 batteries belonging to the Republican Guard air defense.

Fifth: 1 OSA missile battalion belonging to the field air defense.

Sixth: 39 guided anti-aircraft battalions, including 26 regional battalions, 9 battalions belonging to the field air defense and 4 battalions belonging to the Republican Guard Air Defense.

Seventh: 36 non-guided anti-aircraft battalions, including 21 regional battalions, 13 battalions belonging to the field air defense and 2 battalions belonging to the Republican Guard Air Defense.

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B. Warning and Control System

The Warning and Control System has the following:

First: 4 warning and control command at a rate of one command for each air defense sector.

Second: 14 warning and control battalions composed of:

- (1) 60 warning and control radar platoons.
- (2) 22 guidance centers.
- (3) 14 control companies.
- (4) 16 warning companies.
- (5) 25 observation companies composed of 610 visual observatories deployed with several surveillance lines on the borders, inside, in depth, and in a consecutive manner.

C. Intercepting force: Squadrons of interceptors were positioned in the air bases, especially within the middle region within the sector of the first air defense sector and air bases in other sectors as follows:

First: First air defense sector

- (1) Tammuz Air Base including 5 armed MiG-25 aircraft from the 97th Squadron and 5 armed MiG-29 aircraft from the 39th Squadron.
- (2) Al-Suwayra Airport: 5 armed MiG-23 aircraft from the 63rd Squadron.
- (3) Qadisiyah Air Base: 5 armed MiG-23 aircraft from the 63rd Squadron and 3 armed MiG-25 from the 96th Squadron.
- (4) Abi Ubaida Base: 3 armed Mirage-F1 aircraft from the 89th Squadron.
- (5) Talha Al-Mutaqaddem Airport: 3 MiG-23 aircraft.

Second: Second air defense sector

- (1) Sa'ad Air Base: 5 armed MiG-23 aircraft from the 73rd Squadron and 3 armed MiG-21 aircraft from the 41st Squadron.

Third: Third air defense sector

- (5) Armed MiG-21 aircraft from the 9th Squadron were assigned to the sector at Ali Air Base.

Fourth: Fourth air defense sector

1. At Saddam Air Base: 3 armed Mirage-F1 aircraft from the 79th Squadron and a detachment of 3 armed MiG-23 or MiG-29 aircraft.
2. Tal 'afar Airport: 5 armed MiG-21 aircraft from the 14th Squadron.

Fifth: The number of armed aircraft from the abovementioned squadrons assigned to the interception increased with the increase of the threat possibilities.

D. Communications: Communications between the main operation centers and the operation centers of the air defense sectors, the command locations of the anti-aircraft formations and units, the squadrons of interceptors, and the warning and control battalions, companies, and platoons were provided through the following:

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First: Axial wire communications.

Second: P.C.M. wire communications.

Third: Guided L.O.S. communications.

Fourth: HF-VHF wireless communications.

Fifth: An axis of light cables between the headquarters of the warning and control battalion in Al-Nakheeb and the first sector through the knot of Kilometer/160.

Sixth: Surface-to-air VHF/VHF communications between the guidance and interception centers, in addition to the transmission system of digital communications operating with a VHF frequency.

E. Technical equipment

First: Remora French defensive stations for positive jamming carrying a number of Mirage aircraft and a limited number of MiG-29 aircraft to affect the radar of the adversary's combat aircraft and the auto-guidance heads of the radar missiles.

Second: A number of reconnaissance stations opened in the western sector to detect the radar activity of the Israeli Hawk Eye early warning, command and control aircraft, although these stations lacked that kind of radar jamming. This matter will be brought up in detail by the technical equipment commander.

22. The Air Defense after August 2, 1990 until the beginning of the aggression

After the liberation of Kuwait on the 2nd of August 1990, orders were issued to set a complete plan for the air defense system of Kuwait and to consider it as a complementary mission of the Iraqi air defense system. This required the supply of this system's needs from the available and scattered resources of the headquarters and vital projects, in addition to the supplementary formations and units created to satisfy the added needs of the region. A fifth air defense sector was created and composed of:

A. Headquarters of the fifth air defense sector with all its staff panels, and related offices, formations, and units.

B. Warning and control system composed of:

First: 35 warning and control battalions.

Second: A warning company composed of 3 radar platoons and a reserve platoon.

Third: A control company for Adnan Base.

Fourth: 2 original and additional observation companies with 38 visual observatories stretching along the borders, in addition to the northern observatories between the Iraqi and Kuwaiti borders.

Fifth: This system included 14 radar equipment of all types, a voluntary operation center RP. 4 communication axes were used, including 3 Turbo Scooters D2 axes and an axis line-of-sight (LOS). Axial wire communications were provided between the sector's operation center, the platoons and a number of observatories. 6 VHF/VHF wireless communication equipment were used and assigned to communicate with the aircraft.

Sixth: P-40 radars were assigned to escort the movement of the ground troops in case they rush to other locations. A piece of radar equipment with a changeable location was assigned to the maneuvering and jamming purposes.

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Seventh: The operation center of Air Defense Sector/5 and the guidance centers in the radar platoons practice the command and control. The aerial situation for radio detection is maintained voluntarily in the third Defense Sector through the Warning and Control 22nd Battalion in Sanam mountain region. The air defense commands are notified through the available communication lines.

C. Anti-aircraft weapons: The air defense weapons listed hereunder were assigned to the protection of the whole Kuwaiti area, and in particular the regions where the ground units, airports, and important communication knots exist, as a first priority. This was done by maneuvering regional anti-aircraft weapons, in addition to the available anti-aircraft weapons belonging to the field air defense operated for the regional air defense as follows:

First: Anti-aircraft missile brigade composed of 8 Volga batteries and 4 Pejora batteries to provide protection in the medium and high altitudes.

Second: 57 mm guided anti-aircraft artillery battalion.

Third: 37 mm non-guided anti-aircraft artillery battalion.

Fourth: Roland missile battery with 4 firing units.

Fifth: OSA missile battery with 4 firing units.

Sixth: Strela-2-M missile platoon.

Seven: 2 anti-aircraft machine gun companies.

D. Interceptors force: Because of the small size of Kuwait and the size of the forces deployed within the region, and due to the unavailability of sufficient early warning for the use of interceptors from the airports within the region of Kuwait at Adnan and Al-Abbas Airports, and because these airports are 30-40 kilometers from the borders with Saudi Arabia, they became a target for adversary artillery and missile bombardment. In order to give freedom of action by day and by night to the anti-aircraft weapons in the region, especially when the communication systems are paralyzed since they mainly rely on wireless communications, the President Leader (may God protect him) agreed not to push our bombers in the region where the anti-aircraft weapons are deployed in Kuwait, and to adopt the protection of the interceptors from the rear air bases (Ali Base, Al-Wahda Base, Al-Julayba Airport) within the responsibility of the third Air Defense sector. The interceptors were repositioned in the southern sector as follows:

First: Ali Air Base, 16 MiG-21 aircraft and 5 Mirage aircraft.

Second: Al-Whada Air Base, 7 MiG-23 aircraft and 5 Mirage aircraft.

Third: Al-Julayba Airport, 7 MiG-29 aircraft and 4 MiG-25 aircraft.

23. From the beginning of the operation for the liberation of Kuwait until the completion of units mobilization in the region of Kuwait and Basra to face the adversary's threat, the following field and regional anti-aircraft resources listed hereunder were allocated, which were previously allocated to the regional air defense sectors to reinforce the protection of the ground troops in the regions of their deployment:

- A. 6 anti-aircraft artillery battalions to the Republican Guard.
- B. 4 Strela missile batteries.
- C. 3 Kvadrat missile battalions.
- D. 8 anti-aircraft artillery battalions to the corps.
- E. A large number of communication axes, wireless communication equipment, and cables from the resources of the air intelligence operating in the network of the regional air defense communications were allocated to the ground troops.

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24. **Work coordination between the regional and field air defense:** In order to coordinate the work between the regional and field air defense, an air defense group was created and headed by the Deputy Air Defense Assistant. The group achieved the following:

- A. Continuous visits to the corps and air defense commands to coordinate the liaison, transmission of information, unification of opinions, and combat work.
- B. Provided cooperation between the operation centers of the sectors and the air defense movement rooms of the corps and divisions.
- C. Provided wire and wireless communication lines to the movements with the available capabilities.
- D. Coordinated the field air defense lines and offered suggestions with regard to the deployment of their anti-aircraft weapons.
- E. Continued the reinforcement, camouflage, and consolidation of the anti-aircraft weapons and missile batteries.
- F. Coordinated work and set up the courses of joint operations between the sectors and the field air defense commands.
- G. Supported the field anti-aircraft units with vehicles, VHF/HF wireless equipment, and field wires and provided them with telephone lines.
- H. The Warning and Command Directorate supervised the work of the warning and command companies in the corps' air defense headquarters. It coordinated their activities, checked up on the equipment and machineries' operability, transmitted the regional air defense experience with respect to training, planning and set-up of combat activity procedures to the units and formations of the field air defense and vice-versa.

25. **Paths of potential threat:** It was presumed that the enemy would follow the paths listed below to carry out an attack against Iraq in the following manner:

- A. The enemy would carry out an air attack from the northwest region of Saudi Arabia using the western and middle regions of Iraq, the air bases, operation centers, air defense system, headquarters, and vital projects.
- B. The enemy would carry out an air attack from the north east region of Saudi Arabia using the region of Kuwait, the air bases, air defense system in the southern region of Iraq, headquarters, and vital projects in the middle region.
- C. The enemy would carry out an air attack from Turkey using the air defense system, air bases, and vital targets in the northern region, and would exert a special effort for Project/922.
- D. The enemy would intercept aircraft following two paths, A and B, simultaneously from the Saudi territories and passing through them.

- E. The air enemy would follow path C with one of the two paths: A or B.
- F. The most probable path to be followed by the enemy would be the attack from the southeast region of Saudi Arabia, in addition to the attack from the north. Besides, he would set aside part of his forces to attack some vital targets of the region. It is expected that the enemy would use F-117 Phantom aircraft to attack the headquarters of the political commands and the air defense command centers.

26. **Enemy's capabilities**

- A. The enemy could use his complete air power in Saudi Arabia and Turkey with support from Israel on different axes, from different directions, with a large number of aircraft, with close and different timings, consecutive waves lasting for long periods of time, around the clock, and simultaneously on multiple targets using traditional weapons and remote controlled weapons.

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B. This force reinforced advanced capabilities in the domain of the electronic war and reconnaissance using the specialized aircraft, satellites, and ground stations carried by helicopters, drone aircraft, delusive decoys, and cruise missiles to affect the air defense system in all its sections as follows:

First: The warning and control system.

Second: The radars of the interceptors and their radar and thermal guided missiles.

Third: Guided anti-aircraft weapons, missile guiding stations, and the missiles themselves.

Fourth: Wireless communications (Ground-to-Ground and Ground-to-Air / VHF/UHF/HF)

C. The possibility of using the AWACS and E2C aircraft to provide a full radar coverage of the operation regions and the Iraqi air space, to maintain surveillance of our air bases to fully control the operations of interception, to guide the combat aircraft, and protect and guide the air attack aircraft.

D. The enemy was expected to target the following in the first place:

First: The air defense system including the main operation centers, the warning and control battalions, the radars, and communication knots.

Second: Air bases and airports.

Third: Political command centers.

Fourth: Headquarters and vital and strategic projects.

Fifth: Fuel and electric power stations and dams.

27. Our capabilities

A. The interceptors

First: All of the intercepting aircraft in good working condition and available in Iraq were armed and deployed in the four air defense sectors among 14-16 air bases and airports, according to the potential threat axes. The number of intercepting aircraft in good working condition and armed reached 150-160 aircraft as follows:

1. 60 MiG-21 aircraft.

2. 30-35 MiG-23 ML aircraft.

3. 15 MiG-25 aircraft.

4. 25 MiG-29 aircraft.

5. 20-25 Mirage F-1 planes.

28. Final preparations before the battle: After the political and military situation became clear, the possibilities of an aggression increased with the increase of an adversary air and ground mobilization in the Saudi territories, the Gulf countries, and Turkey. After a long and accurate study of his air activity, especially the Saudi and Turkish air space, by day and by night, and after recognizing his full capabilities, a report of the aerial situation was prepared and it became clear that the enemy will adopt the following main paths to carry out his air attacks against Iraq:

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- A. The enemy will carry out an air attack from the northeast region of Saudi Arabia close to our western border and will target the air defense command and control system, the operation centers, air bases, vital projects in the western region, and as a second priority, other similar targets in the middle region.
- B. The enemy will carry out an air attack from the northeast region of Saudi Arabia and will target the air bases, air defense system, headquarters, and vital projects in the southern and middle regions, and will avoid the region of Kuwait at first.
- C. The enemy will carry out an air attack from Turkey and will target the air defense systems, operation centers, air bases, and vital projects in the northern region and will exert part of his effort to attack Project/922 in Samra'.
- D. The enemy will follow simultaneously two paths: A and B.
- E. The air enemy will use air bases and airports in Saudi Arabia, the western Gulf countries, and from Kuwait to attack our units in them as a first priority, in addition to the air power he has available on the aircraft carriers in the Arabian Gulf and Red Sea.
- F. The enemy's air force will attack our vital projects and military targets inside Iraq, by day and by night, using the very low, medium, and high flying method. In the beginning, he will focus on attacking the air defense command and control locations, air bases, airports, and the warning and control system as a whole. The political command buildings in the capital, Baghdad, will constitute the priority of his targets with a change in his medium and high method of flying during the day, then during the night to decrease his losses, and from which derived the air defense plan with five options for the use of his resources by day and by night. Two working paths were approved to face the adversary: air threat by day and by night. In light of this, the final preparations for the defensive battle began as follows:

First: Warning and control system

- 1. To redistribute the resources of the warning and control system in accordance with the lines set up to provide a continuity in the medium and high altitude detection, and with an altitude of 100 meters for the low detection of specific locations and to rely primarily on the metric radar, which included 77 radar locations and 23 guidance centers operating 24 hours a day.
- 2. To operate radar equipment working weekly in different regions of Iraq and operating centrally for camouflage and maneuvering purposes.
- 3. A central plan was set to operate five radar locations only in Iraq. This provided appropriate radar detection and prevented the enemy from the possibility of wiretapping and watching the radar frequencies and locations where the maneuvering occurred, or where the types of operating equipment were replaced and representing less than 10% of the total air defense radars.

4. To deploy used radar equipment, the transmitters work with a simulated radar transmission for camouflage purpose.
5. To weaken 75 radar equipment in the platoons and to store them in different locations in the battalions for compensation and as a general reserve.
6. To open a new line of observatories from Al-Diwaniya to Jallat with 22 observatories to fill up the gap in the south region of the first sector, and to strengthen the western line of observatories by opening 8 observatories.

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7. To reopen the additional observatories line between the K-160 Al-Ratba- 'Akashat regions.
8. To open 23 observatories between the regions of Sanjar, Al-Hadr, 'Annah, and Rawa.
9. To open 35 observatories with three warning and control platoons in the Kuwaiti region.
10. To create Warning and Control Battalion - 24 in Al-Salman with 3 warning and control platoons and 2 visual observation companies.
11. To move the radar platoons on the borders with Saudi Arabia to a 20-30 kilometer distance from the borders to avoid artillery shelling or adversary infiltration. There will be 6 platoons with all their equipment and administrative affairs.
12. To set a plan specifying the radar equipment and platoons operating at the beginning of the attack, and also including the equipment in the operations region in Kuwait.
13. To replace the region of deployment of the southern visual observatories in Kuwait by following the changes occurring in the military ground troops' deployment.
14. To intensify the inspection visits to the formations, units and visual observatories, to give them a detailed briefing about the plan of operation and use in all circumstances, and also, to follow up on the administrative and technical affairs and their plans of compensation and protection.

Second: Interceptors

1. To arm all of the intercepting aircraft which are in a good working condition, including some of the MiG-21 aircraft intended for training. The total number of the different types of aircraft was 150-160, and they were deployed among the air bases.
2. To replace the interceptors' plans in light of the plan of deployment, the type of aircraft, and the threat axis using the intercepting aircraft available for each sector.
 - A. A plan to face the adversary's air threat coming from the western and southwestern regions of Iraq in the direction of the middle region and Baghdad.
 - B. A plan to face the adversary's air threat coming from the northern and northwestern regions of the basins of Tigris and Euphrates in the direction of the middle region.
 - C. A plan to face the southern and southwestern threats in the direction of the middle region and Baghdad.
 - D. A plan to intercept the adversary aircraft upon its return.
 - E. A plan to intercept the AWACS aircraft.
 - F. Plans to intercept the second air defense sector, including a plan to intercept the TR1 reconnaissance aircraft.

- G. A plan to intercept the planes of the fourth air defense sector with a work plan in jamming conditions.
 - H. A plan to intercept the US TR1 aircraft within the responsibility of the first sector.
3. A comprehensive training on flying interceptors took place after August 2, 1990, in which all the details of the main and alternative guidance centers were specified to be operating under a decentralized command, in addition to radar and radio detection regions to be used by interceptors.

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4. After studying the reduction in radar detection by warning and control systems as a result of the adversary's electronic war activities with specialized aircraft and ground stations, a review was done for the internal and external lines of interception, which our interceptors were being used for, to have command and control capabilities, should the guidance centers be subject to an adversary's air attack.
5. Distributing the ground missions, surface-to-surface missiles, aircraft ammunitions, fuel tanks of the aircraft intercepting from bases, airports, and secondary airports to provide resupply of the aircraft in case of an emergency landing outside their regular bases.
6. Intensively brief the pilots in the air bases, guidance centers, and sectors on the intercepting plans and work procedures in case a jamming or telecommunication paralysis occurs to conduct training practices accordingly and to specify the aircraft landing tracks in the air bases in case of emergencies.
7. Setting operating procedures for the intercepting aircraft using radio control method, in order to recognize the air activities of the enemy and to conduct practical training on these activities.
8. Continuous visits to the sectors and air bases in order to explain the work methods and procedures, the aviation, and changes in the intercepting plans in light of the modifications occurring in the enemy's activities. To memorize the characteristics of the air-to-air guided weapons that we have and those which the enemy has, the methods for implementing the air defense plans, the cooperation between the members of the formation, and to explain the requirements of the electronic war and the expected methods of the enemy's aviation.

Third: Anti-aircraft weapons

1. Preparing a plan for the deployment of the guided and non-guided anti-aircraft weapons with the available capabilities to protect the headquarters and main vital projects for which the protection has become a necessity, such as the air bases, airports, electric stations, fuel installations, dams, storage complexes, silos, roads, bridges, and others.
2. Redeployment of weapons within the vital location to face the traditional air attack and remotely with the available resources of weapons and communications.
3. Establishing alternate locations for the units command and control, to strengthen them, and provide them with the available communications.
4. Increasing the ammunition and missile supply lines for all anti-aircraft units, and setting a compensation plan for ammunitions based on the regions to guarantee the continuity of the weapons' efficiency with the expected continuous adversary attack by day and by night.
5. Withdrawing anti-aircraft weapon equipment for 5 batteries from Kuwait to Baghdad, to reassemble them and repair the damaged ones, and to equip 4 batteries for the combat activity. Iraqi crews were trained and deployed to protect Baghdad

for an appropriate period of time and they worked efficiently during the period of operations.

6. Setting procedures for the fire coverage at night, within the initial range of the cannons. Effective shelling practices were conducted several times during the day and the night for all anti-aircraft weapons in the projects, air bases, and other locations of the country, which boosted the combat competence of their crews.
7. Training the anti-aircraft weapon personnel in the middle region on observing and differentiating the adversary cruise missiles and by watching the aviation of their miniature prototypes manufactured by the Military Industrialization Commission.

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8. Creating the colored lighting torch system to increase the anti-aircraft weapon preparedness level, to release them, and to restrict them when the communications are interrupted or paralyzed. These torches were distributed on the field regional weapons.
9. Creating a smoke battalion in the Atomic Energy System Project 777. Practices on the deployment and smoke generation plans were conducted for an appropriate period of time.
10. Setting procedures for the cooperation between the regional and field air defense and to follow-up on them by the committees created for this purpose.
11. Create multiple committees to examine the combat readiness of the formations and units by making intensive field visits, supervising the deployment and the alternate locations, completing the ammunition lines, and providing the items needed for control.
12. Conducting intensive real air exercises by using the available aircraft and jamming equipment by day and by night, and by training the artillery commands and missile brigades on facing the adversary air threat, especially the low altitude one.
13. Adopting the air defense in all directions, 360,° especially in the decentralized and mixed command conditions by diversifying the guided and non-guided systems within the location in order to reduce the impact of the adversary's electronic jamming, and also with a cooperation between the neighboring positions.
14. Setting plans for the air defense to take advantage of the light, mono, and duo machine guns belonging to the Popular Army with more than 300 machine guns. They were distributed all over the country so they would be used with the anti-aircraft weapons. The requirements for the command and control were provided, as well as the signal equipment.

Fourth: Technical equipment

An electronic war plan was set for the Air Force and Air Defense by taking advantage of the available technical and tactical capabilities. Practical exercises and courses were conducted, and the combat use procedures of all air defense formations and units were set. They will be raised in details by the commander of the Air Force and Air Defense technical equipment.

Fifth: Communications

1. The supply of the available wire communication lines to all air defense formations and units were checked, in addition to the good working conditions of the main guided communication axes D4/D2 within the warning and control system.
2. The courses of activity during an electronic jamming were set and the regions suffering from radio transmission insufficiency for the wireless equipment were determined in light of our assessment for the enemy's capabilities in this field.

3. Fulfilling the needs of the ground formations and the commands of the air defense corps and units of wireless equipment, communication axes, and field cables from what is available at the air signal command.
4. Supplying telecommunications for the fifth air defense sector in Kuwait by taking advantage of the Kuwaiti axial lines and the available equipment and machineries.

Sixth: Air Defense Infantry

1. Reinforcing the ground protection of the western region's bases and airports with infantry and commando units, especially the Al-Walid, Sa'ad, and Qadisiyah bases and the Talha, Al-Salman, and Al-Julaiba airports at Ali Base.

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2. Setting local defense courses for the formations and units with the available capabilities in men and weapons and follow-up on them.
3. Reinforcing the ground protection of the strategic headquarters and projects, especially the Atomic Energy Organization and Al-Qa'em and 'Akashat Project.

29. Aggression period: The Air Defense System was placed in a complete state of readiness for a long time, especially with the increase in the probability of the beginning of a large adversarial ground and air attack. All the plans, procedures, work, and operation methods set by the Command and Air Defense Staff members were totally created and delivered to the formations and units. All briefings focusing on the battlefield were done at the command headquarters with all their details. Practices were conducted in large numbers on everything mentioned in these briefings. In preparation for the aggression, the main and alternate locations of the command were completed and they operated for all the sections of the Air Defense System. Orders were given to all the air defense formations and units to increase the degree of combat readiness for aircraft interception. As of minute one on January 15, 1991 and at 0230 hours on the night of January 17, 1991, the adversary air operations began against Iraq when the enemy's aircraft violated our international borders coming from the Saudi air space.

30. After completing all the preparations and operations for the redeployment, reinforcement, and maneuvering with the air defense weapons so as to procure protection to the ground troops present in the region of Kuwait and all the vital targets inside Iraq, and after the commanders and the command staff made all the field visits to verify the degree of readiness and coordinate between the field and regional air defense in the region of operation in Kuwait, orders were given to all the air defense formations and units operating on January 15, 1991 to increase the degree of alert to the maximum and to be ready to face a potential aggression. After implementing the final modifications, all final plans were delivered to the commanders of the Air Defense sectors following a briefing on these plans. The commander, in return, delivered these plans to the units.

31. On the last hour of January 16, 1991, signs of the adversary's air attack began to show up through the enemy's intensified air activity in the Saudi region close to our international borders: the repeated reconnaissance operations over the border strip, in addition to the increase of electronic war activities in the region, especially against the border radars and the warning and control equipment.

32. On January 17, 1991, at 25 hours [*probably meaning 1 o'clock in the morning*], the technical equipment detected an AWACS aircraft in the Turkish territories. At 2:30 on the same day the adversary's air operation against Iraq began. An intense air activity was observed inside the Saudi air space close to our borders, simultaneously with a jamming that occurred on the equipment of some warning and control border battalions.

33. On January 17, 1991, the adversary's firing violated our international borders from the south and west only. The operations of interception began in the northern sector on January 18, 1991 and the axes approach the vital targets, and they were:

- A. Saudi/Iraqi borders - Al-Nakheeb - Al-Razaza - Target region.
- B. Iraqi borders - Najaf- Al-Hella - Target region.

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- C. Iraqi/Iranian borders - Al-Suwaira - Target region.
- B. Iraqi/Turkish borders - Vish Khabour - Intended target.
- E. Iraqi/Turkish borders - Kani Masi - Intended target.
- F. Red Sea - Mediterranean Sea - Intended target.
- G. Israel - Aqaba - East of Al-Naza'em - Intended target.

The adversary's targets were violating our international borders at different altitudes going from 100 meters to 10 kilometers.

34. The vital targets the enemy aimed at during the first three days were:

- A. The command and control system of the Air Force and Air Defense units.
- B. Communications in all parts of Iraq (telephone switchboards, cables, communication hubs).
- C. Air bases and airports.
- D. Industrial projects and military industrializations facilities.
- E. Electric power stations.
- F. Refineries and oil installations.
- G. Main roads on highways and bridges.
- H. Air defense units (missile brigades, missile battalions, radar artillery, observatories, and operation centers for battalions).
- I. Political command buildings and residences of the President Leader (may God protect him).
- J. Residential civilian targets.

35. The methods of attack adopted by the enemy at the beginning of the aggression consisted of attacking from all types of altitudes: low, medium, and high. But as a result of the losses incurred on the enemy's aircraft, especially when fulfilling their duties at a low altitude, the enemy gave up this method and switched to flying at high altitude to avoid the intense Iraqi anti-aircraft artillery fire positioned around vital targets and projects.

36. The weapons used by the enemy in his aggression against Iraq were the cruise missiles; F-117 Phantom aircraft; A-10, F-111, F-16C, and F-15C Tornado aircraft; and Mirage F-4E, F-18, B-52, A-6, 2000, and F-1 aircraft. The enemy used traditional bombs, laser guided bombs, anti-personnel bombs, anti-radar beam missiles, decoy targets, and highly explosive bombs.

37. Operations of interception by aircraft: Despite the limited number of our interceptors ready to face the potential enemy's interceptors, they performed successful operations of interception, in which MiG-29, MiG-25 and Mirage F-1 aircraft were used. They were able to down 5 adversary aircraft confirmed by the sources: there were 4 aircraft in the first air defense sector and 1 plane in the second sector. The number of sorties carried out by our interceptors was as follows:

- A. 29 immediate sorties in the first air defense sector
- B. 8 immediate sorties in the second air defense sector.

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C. None in the third defense sector.

B. 29 immediate sorties in the fourth air defense sector.

38. Interception by missiles and artillery: The anti-aircraft system took several continuous measures for the purpose of protecting the headquarters, strategic and very important projects, and the limited projects of the anti-aircraft weapons. Due to the considerable amount of targets that required protection, these anti-aircraft weapons were able to divert a large number of adversarial firing. These results were obtained due to the use of the following:

A. Use of the Hawk missile system as an air defense system, and for a short time.

B. Use of the Sarab system manufactured by the Air Force and Air Defense command, which provides false radar radiance with the same beams of frequency to the missile guidance station, which proved its effectiveness in exhausting the adversary's radiation missiles.

C. Use of shiny tin sheets in the proximity of the Roland firing units and the missile guidance stations to disperse the laser guided missiles.

39. Maneuvering with the air defense resources: The maneuvering during the battle was carried out in the following manner:

A. Command and control locations - Conversion to alternate centers for operations, command and control on all the levels of command, instead of the operation centers of the air force and air defense and the operation centers of the air defense sector, and also on the level of the missile brigades and battalion headquarters.

B. The maneuvering with the command and control resources took place in the following manner:

First: Reducing the number of radar equipment operating based on the enemy air activities and providing the command and control requirements.

Second: Maneuvering with the locations of the radar equipment and also maneuvering by operating between the locations.

Third: Replacing the fallen visual observatories with other new ones, making sure there are no gaps in the surveillance line.

Fourth: Specifying the performance of centimetric and decimetric band radars and using them at a specific time and when needed.

C. Anti-aircraft weapons: The maneuvering occurred in the following manner:

First: Not opening the transmission of the missile systems until the adversary's targets enter the phase of destruction and confirmed firing.

Second: Using the intermittent operating system of the centimetric and decimetric band radars instead of the continuous transmission to decrease the percentage of losses and to detect the locations of batteries.

Third: Using ambushes on the axes where the enemy approaches towards the vital targets.

Fourth: Maneuvering with the Roland and OSA firing units and Volga, Pejora, and Hawk missile batteries between the different locations to decrease the size of losses in equipment and individuals.

Fifth: Using the TV system of the Volga, Pejora, Kvadrat, and OSA missile batteries and the visual system of the Roland during the day.

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Sixth: Adopting the principle of strengthening the locations as a main method to maintain the equipment and minimize the losses.

Seventh: Changing the deployment of the location of units charged with the protection of vital projects.

D. The whole maneuvering with the resources of the anti-aircraft weapons and the warning and control was the following:

First: The maneuvering with 140 visual observatories and the changing of the location of their deployment with all their machineries and administrative equipment.

Second: the maneuvering with more than 150 radar equipment of different types and a number of command and control centers belonging to the warning and control battalions during the battle.

Third: The maneuvering and changing the locations of 116 Volga, Pejora, and Hawk missile batteries and 62 Roland and OSA firing units.

Fourth: The maneuvering and changing the locations of 36 guided and non-guided anti-aircraft artillery batteries and 107 Strela sections.

40. The instructions of President Leader (may God protect him) during the Mother of all Battles were as follows:

A. On January 17, 1991, at 0800, the President Leader (may God protect him) visited the operation centers of our command and His Excellency instructed the following:

First: Study the aircraft maneuvering on the bases, especially the MiG-29 aircraft, because the enemy will try to focus on the bases that will have fewer losses and also on the anti-aircraft units.

Second: The opening of fire of anti-aircraft weapons should be at an early phase, provided that their ammunition doesn't get depleted, taking into consideration to make up for the gaps of the anti-aircraft weapons.

Third: The firing in the city of Baghdad was continuous and intense for 50 minutes. At first, the shooting was random, then it became under control.

Fourth: Notifying the air defense sectors to implement the firing instructions, because the enemy will try to force us to use our ammunitions continuously.

Fifth: To discuss the problems with the air defense sectors.

B. As a result of the enemy air attack targeting our vital industrial plants and the great damages occurred in some of them, instructions of the President Leader (may God protect him) were issued in his letter dated January 19, 1991, addressed to the Commander of the Air Force and Air Defense, ordering a maneuver with some anti-aircraft weapons stationed at the industrial plants which were destroyed by the enemy toward the targets which the enemy has not destroyed yet.

C. As a result of the evidence showing the intention of the enemy to destroy the infrastructure of Iraq, the President Leader (may God protect him) in his letter dated

January 21, 1991, addressed to the Air Defense's staff, ordered the requirement to cut down on everything, along with performing the mission entrusted to our armed forces, in order to maintain the weapons and equipment and to cut down on the use of ammunition.

D. On January 27, 1991, the President Leader (may God protect him) addressed a message to the courageous air falcons [*meaning the Air Force officers*], in which he showed the reasons for issuing the orders to our command on January 26, 1991 to send the aircraft to Iran. He emphasized the enemy's air superiority that limited the use of aircraft during the battle. For safekeeping the pilot and the aircraft, the aircraft were sent to Iran until the appropriate time came to use it against the enemy.

E. After reviewing the report of the daily situation, the President Leader (may God protect him) used to give his instructions including:

First: On January 22, His Excellency emphasized defining the positions of the helicopters and engaging them with mobile patrols armed with Doshka guns.

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Second: On January 23, 1991, His Excellency ordered the withdrawal of the border observatories toward the ground troops so they would be under their protection.

Third: On January 29, and as a result of the losses in the air defense resources, His Excellency ordered the immediate formation of a central work team composed of the Military Industrialization Commission, the Air Force and Air Defense from which will derive specialized committees to undertake the repair of equipment that could be repaired with the available resources, and as soon as possible.

Fourth: After His Excellency reviewed the evening situation on January 29, and the situation of the enemy's interceptors that he placed as air umbrellas over Mandali and the Kilo 160 region, His Excellency instructed, "You should set mobile ambushes and study the possibility of setting air intersection ambushes." The Samurra' operation was carried out in light of the instructions given by the President Leader.

Fifth: On February 3, and after His Excellency reviewed the status report, he focused on the necessity of scattering the expensive equipment and machinery which could not be acquired while in war, and on reinforcing the shelters so that the enemy's pilots could not find them.

Six: On February 6, His Excellency ordered the reinforcement of the corps' anti-aircraft defense with regional air defense resources, and that priority in the reinforcement is given in accordance with the General Staff's instructions.

41. As for the coordination with the ground troops especially in the region of Kuwait and Basra, it was performed by opening an Forward Operations Center related to the Air Force and Air Defense, and works through the operations center of the General Command of the Armed Forces in Basra. The exchange of information and the dispatch of orders were done through this center and through communication devices, which continued until the end of the battle, or through liaison officers. The corps' requests for reinforcement with anti-aircraft weapons were passed from the regional Air Defense to the field Air Defense through this center, in addition to the maneuvering of weapons and passing orders of redeployment according to the requirements of the situation to provide protection for the hubs and the locations used as positions for the ground troops. Also the operations for compensation with weapons, machineries, and individuals were done by passing the requests from Kuwait and Basra to the said center. There was a direct cooperation between the staff personnel of the Military Movement Office, the Office of the Chief of Staff of the Army, and our command with regard to providing ground protection to some locations and equipment which the enemy was able to access through landing operations or land and air infiltration. These violations were immediately reported and the situation was handled by the ground units.

42. Decentralized control: The attack of the main communication hubs by the enemy led to the lack of communications between the main headquarters, and the headquarters and locations of the formations and units command, in addition to the intense jamming on all types of the telecommunications system. Therefore, a decision was made to switch to working with a decentralized control of all the command

centers and weapon commands' locations according to the procedures conveyed to these formations and units. In addition, it was decided to use the liaison officers and authorized individuals to dispatch the orders and notifications to the said headquarters, and to shift to the alternate and numerous headquarters and command locations so that the enemy would miss the chance of mastering and attacking these locations.

43. Enemy's mobilization: The enemy relied on the intense raids of the vital targets. The depth of these raids was huge, where his aircraft was over the city of Baghdad and was striking it, followed by the rest of the aircraft, which were in the depth of the Saudi territories. The raid would last one full hour or more, and the adversary aircraft were composed of the following:

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- A. A number of F-18 aircraft carrying 4, 6 or 8 Harm missiles depending on the intensity of the raid, to handle the warning and control radar equipment or the anti-aircraft weapons.
- B. A number of F-14 aircraft, depending on the intensity of the raid carrying deceptive aircraft for the purpose of depleting the Iraqi Air Defense System of its missiles and artillery. These targets were launched outside the weapon range so they would appear as targets on the radar screens of the weapons, or the shooter would see them at night from the fire flash they hold and he would start firing on them. A direction was outlined to differentiate these targets from the real ones by letting the shooters wait before shooting, since the speed of the fake target slows down, unlike the real target. Therefore, the exhaustion of air defense weapons the enemy aimed at was avoided.
- C. A number of F-14 or F-15 at the rate of 4-6 aircraft, as air defense aircraft for protection purpose. After the first two weeks of war, the enemy established locations for his air umbrella over Mandali and Kilometer 160 in a continuous manner. Ambushes for his umbrellas were set on the ground and in the air. Two F-15 aircraft were shot down over Mandali, using the Mig-25 aircraft in the Samurra' operation, where the Mig-25 took off from Tammuz Air Base. An instruction was given by the first air defense sector to the Commander of Formation 2 about the direction of the adversary's targets. We were able to down two of the four aircraft. Later on, our aircraft were chased by the enemy until landing safely in Tammuz Air Base.
- D. The striking aircraft assigned to intercepting the target, whose number could reach more than 40 aircraft.
- E. The enemy's aircraft would come from defined axes through the Saudi territories. The AWACS aircraft present over the regions of Al-Salman, Kilometer 160 and south of Wan Lake in the Turkish territories would start assigning targets to these aircraft. The enemy's aircraft would often and continuously circle over selected Iraqi areas, looking for air-to-air mobile missile platforms in the nearby area after we launched missiles in the direction of the Zionist enemy's territories in Tel Aviv.

Planning for the Air Force operations

- 44. Considerations:** Studies and assessments of the situation were prepared, on the basis of which our command's plans were laid so as to face all the possibilities of the allied aggression that aimed at destroying the economic, industrial and military capabilities of Iraq and the infrastructure of life's basics in our beloved country.
- 45. The most important factors** taken into consideration when planning the air operations are summarized as follows:

- A. A comparison between our combat capability and the allied aggression's capability. Based on the study undertaken in this respect, it appeared that the air enemy, in light of his well-known quantitative and qualitative capabilities, in addition

to the forces he was able to mobilize under the UN umbrella, was able to achieve a general air superiority coefficient exceeding the proportion of 12:1 in favor of the enemy when considering together the quantitative and qualitative comparison. This superiority offered the enemy the possibility of securing air superiority during a standard period of time.

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B. Since the enemy had the advantage to initiate the battle for well-known political considerations, and this advantage was associated with the advantage of mobilization, which the enemy could provide as referred to in the paragraph A above, thus this required from our air force in the first phase to be ready in order to absorb the impact of the expected huge air attacks, by resorting to the negative air defense measures. The most important measures were the deployment of aircraft and equipment, as well as the command and control locations, for the purpose of dispersing the enemy's efforts and diminishing our losses to the minimum, and to be ready to respond when the situation allows it. The appropriate response using the air force should be launching of infiltration raids, because of the expected difficulty in providing the required mobilization due to the deployment of the adversary aircraft and the enemy's capability to achieve air superiority during a short period of time.

C. The diversity of the threat's sources and directions including the south, west, and north imposed challenges on our air force, as to whether it was possible to take advantage of the depth offered by some air bases and airports for the purpose of protecting our aircraft deployed there. This fact limited the allowed degree of flexibility for the mobilization and the use of the required air power from the bases and flexibility required by the set intercepting plans. In return, this required us to confirm the negative defense measures with all their dimensions, wherever the aircraft exist.

D. In addition to the advantage above and the strategic depth which most of the adversary targets in Saudi Arabia or the Zionist entity or the fleets at sea enjoy, this had limited the war cargo of the air attack aircraft, which required the set-up of a plan for the use of the air refueling for part of the attack aircraft equipped with that feature, such as the Mirage and Sukhoi-24 aircraft and the repositioning of the ground attack aircraft that were not equipped for the possibility of refueling in the front line bases, should a military engagement occur.

E. When comparing the many obligations of the air force regarding the implementation of the numerous required plans that will be mentioned later on with the available effective air power, we required the set-up of priorities to be carried out based on the development of the situation in order to provide the appropriate mobilization for the achievement of the required impact.

F. Intelligence information: The intelligence information about the enemy was not sufficient to cover the needs of the detailed information plans for many reasons, the most important of which was that the intelligence effort before the crisis was not directed toward the Arab countries. Besides, the fast and changing mobilization of the adversary's coalition forces in the region and the embargo to which Iraq was subjected, prevented us from going along with the changes occurring in the situation, in addition to the political considerations requiring that we avoid any provocation in case of any air violation on our part, aiming at carrying out air reconnaissance operations. The information about the strategic targets were obtained by following-up thoroughly with some civil offices, such as the Media Documentation Center for

Radio and Television and also through the newspapers, magazines, publications and space pictures.

Plans of the Air Force Command in facing the coalition forces

46. As of August 12, 1990 and the subsequent period, the Air Force Command began preparing the required plans to face all the possibilities of aggression. It is worth mentioning that most of the plans set were continuously reviewed in light of the continuous changes occurring in the situation with regard to the size of the threat, its type, and directions. We list hereunder the plans prepared showing the Air Force's obligations in facing the possible allied aggression.

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A. Participation in the Air Defense's plan by using the interceptors, which constitute an important part of the Air Defense's plan structure. The plan included preparing the aircraft that could be pushed to confront the potential adversary's air interception, the plan of maneuvering with Air Defense's squadrons, and the repositioning in air bases and airports, and also plans for the protection of the air attack aircraft during their departure and return.

B. Plans to attack the adversary's strategic targets. Most of the targets selected were the ones which had the greatest impact on the enemy, from a material and psychological viewpoint and carry a malicious and deterring nature as a response to the enemy's attack on our vital targets. The most important challenges faced while planning for these operations were the lack of sufficient information, especially the air pictures of the adversary's strategic targets, the lack of the element of surprise during the carrying out of missions because of the presence of AWACS aircraft, and the great depth of the adversary's targets.

C. Plans of a comprehensive response to any Zionist adversarial offensive. These plans were prepared before August 2, 1990, and precisely after March 18, 1990, following the escalation of Zionist threats to attack our vital facilities. Training practices were conducted from all aspects and this plan was considered part of the plans for a comprehensive response against a potential air offensive more probable from the south, west, and north and which was disclosed after August 2, 1990.

D. Plan for handling the Saudi airports: This plan aimed at launching an offensive on a part of the bases and airports in Saudi Arabia, in which the adversary coalition aircraft were positioned and which were within the range of aircraft activity, starting with our southern bases and airports.

E. Plan to support our naval forces north of the Arabian Gulf: This plan aimed at the effective interference of our Air Forces toward the adversary's operations of naval landing on the southern Iraqi shores in accordance with a plan coordinated with the naval forces by day and in a limited manner by night. The plan included the use of all types of advanced aircraft carrying sensitive weapons (laser weapons, radar, and television guided weapons), the specification of the command and control basics and the aspects of coordination with the naval force, and also a search and rescue plan for the pilots.

F. Air support plan for the defensive operations: The most important content of this plan is the following:

First: To allocate aircraft and to make sure that the special support aircraft are used. To reduce the reliance on the advanced long range ground attack aircraft, because they are specialized in strategic shelling missions.

Second: To emphasize coordination with the ground forces when the battle is taking place, especially during the interruption of communications.

Third: To avoid storing the aircraft in the front line bases and airports for the purpose of the plan, on condition that the reinforcement be done in light of the developments occurring in the situation.

Fourth: To avoid using the aircraft for the duties of support unless in emergency situations and following the first phase of the adversary's offensive, in order to give our anti-aircraft weapons the opportunity to impact the enemy's aircraft.

G. Plan to support our units during their offensive operations: This plan completes the defensive support plan referred to in paragraph E above, and confirms the following with regard to the implementation:

First: The support plan of our units during their offensive operations will be in two phases. The implementation of the second phase requires the use of airports in Kuwait, and this depends on the air situation.

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Second: In case the enemy is the first to begin the offensive, the air support plan for the defensive operations shall be implemented and in the first place the plan to support the naval forces. When our troops withstand the momentum of the adversary's attack, then the offensive plan should be implemented. The situation might require the implementation of the counter-offensive plan on the adversary's bases and airport to minimize the impact of the enemy air forces' attack on our advanced units. Though, the impact of the counter-attack will be limited due to the limited power of our available counter-attack force and the enemy's access to alternate ways since he could operate from bases relatively distant, not to mention the aircraft carriers available to him in addition to the effectiveness of his naval forces and helicopters attacking our forward units. For this reason, the plan emphasized that the battle be fast, surprising, and relies on night operations to minimize the impact of the adversary's air forces.

H. Plan to face the adversary's helicopter airdrop: A plan was set in coordination with the ground forces and army aviation, specifying the responsibilities for facing the potential adversary's airdrop operations and the allocation of the required air power to execute the immediate sorties. Also specified were the appropriate weapons to face an adversary airdrop, as well as the role of the ground units, air force, air defense, army aviation, and the command and control requirements.

I. Plan for lighting up the battlefield: A plan for lighting up the battlefield was prepared to light up a specific area with coordinates for army purposes. The plan included the allocation of air power to be ready when immediately needed.

J. Rescue plans for pilots: These plans included the allocation of rescue helicopters and their deployment in the bases and airports, so they would cover the largest area possible of the scene of operations of our air forces and in light of their activities.

K. Negative defense plans: The Air Force Command realized the extent of the qualitative and quantitative superiority which the enemy could get, in addition to the fact that the enemy holds the advantage of initiating the attack for well-known political reasons. Thus, negative defense plans, which included the deployment of equipment, weapons, and command and control centers, as well as measures of camouflage and trickery, were aimed at absorbing the destructive power of the adversary air force and preventing them from achieving their ultimate goals in destroying our air capabilities. At the same time, this gives our forces the opportunity to respond by inflicting the largest enemy losses as possible.

L. Electronic war plans: They will be mentioned in their own field of discussion.

Management of the air battle

47. Preparation: The preparation of the Air Force Command aimed at achieving two main goals: The first goal is to provide a very high level of combat preparedness to all of the Command's formations and units, and to guarantee the continuity of command and control over these units. The second goal is to reinforce the capability

of facing the imminent adversarial offensive, to work on diminishing its impact, and to continue the struggle in order to prevent the enemy from achieving his goals. Below, are the most important aspects that were focused on during the process of preparing for the battle:

A. To redeploy the combat squadrons in the secondary air bases and airports to satisfy the requirements of the plans and deployment as follows:

First: 5th Squadron/Sukhoi-20 at Al-Hurriya Air Base.

Second: 93rd Squadron/MiG-23 at Farnass Airport.

Third: 79th/89th Squadron/Mirage at Saddam Air Base.

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Fourth: 131st Squadron/MiG-21 at Saddam Air Base the National Squadron
Fifth: 14th Squadron/MiG-21 at Al-Farouq Airport Tala'afar.
Sixth: 97th Squadron/MiG-25 at Qadisiyah Air Base.
Seventh: 39th Squadron/MiG-29 at Qadisiyah Air Base.
Eighth: 121st/8th Squadron/Sukhoi-24 at Bakr Air Base.
Ninth: 9th/69th Squadron/Sukhoi-22 at Bakr Air Base.
Tenth: 63rd Squadron/MiG-23 interceptors at Bakr Air Base.
Eleventh: 81st/91st Squadron/Mirage/at Abi Obeida Air Base.
Twelfth: 49th Squadron/MiG-23 ground attack at Ali Air Base.
Thirteenth: 9th Squadron/MiG-21 at Ali Air Base.
Fourteenth: 109th Squadron/Sulchoi-25 at Ali Air Base.
Fifteenth: 44th Squadron/Sukhoi-22 at Tammuz Air Base.
Sixteenth: 115th Squadron/Sukhoi-25 at Tammuz Air Base.
Seventeenth: 6th Squadron/MiG-29 at Tammuz Air Base.
Eighteenth: 10th Squadron/TU-16 at Tammuz Air Base.
Nineteenth: 96th Squadron/MiG-25 at Tammuz Air Base.
Twentieth: 47th Squadron/MiG-21 at Sa'ad Airport.
Twenty-first: 73rd Squadron/MiG-23 at Sa'ad Airport.
Twenty-second: 37th Squadron/MiG-21 at Al-Walid Air Base.
Twenty-third: 8 MiG-23 ground attack aircraft + 6 Sukhoi-22 aircraft at Al-Yaseri Airport.
Twenty-fourth: 6 Sukhoi-25 aircraft at Shaheed Mushreq Airport Qal'et Saleh.
Twenty-fifth: 6 Sukhoi-25 aircraft at the former Al-Wahda Air Base.
The number of ground attack aircraft assigned to the execution of duties amounted to
() [left blank] aircraft.
B. To prepare the alternate locations of the command and control centers for all levels of command, and to designate the original and alternate staff panels to operate these centers in order to guarantee the continuity of command and control over the Air Force's formations and units in all circumstances, taking into account the exposure to conditions of weapons of mass destruction.
C. To achieve alternate communication projects in cooperation with the military and civil parties in a way to maintain communication in case the main communication axes are interrupted or destroyed.
D. To give maximum attention to the security of communications by adopting telecommunications as much as possible, avoiding operating the telecommunication media and the guided telecommunication media, and preparing the requirements of the alternate communication means in case the communications are interrupted (communication messengers and liaison officers).
E. To distribute the plans on the air bases and the alternate command locations and to brief the commanders and staff panels on the details of these plans so they would be ready to be implemented with a short notice once the orders are issued in this respect.

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F. To focus on the tactical training in circumstances similar to the ones of the potential operations, to conduct exercises for testing some of the plans, and to begin the rehabilitation and training of the reserve pilots working in the training units and squadrons of the combat aircraft.

G. To provide all the requirements to re-operate the structured and operating airports and to complete whatever is missing in them, to stack up on ammunitions, fuel and support equipment necessary to operate the aircraft according to the set plans, which also included preparing for [*driving on*] the highways and practicing on them.

H. To begin preparing the requirements for the execution of the negative defense plans, such as the protection of aircraft, equipment, weapons, and reserve materials. This included the start-up of the deployment of aircraft and equipment in all of the air bases and airports in a way to achieve the dispersal of the enemy air power and to minimize our losses.

I. To perform intensive campaigns to increase the operability of the aircraft and equipment and to carry out the necessary modifications on the aircraft systems to increase their combat capabilities.

J. To begin implementing the plans for the deployment of the air force squadrons in the bases and airports, especially the squadrons of interceptors, in compliance with the air defense plan.

K. To redistribute the engineering effort on the air bases and airports and to coordinate with the civil offices to exploit the machineries and engineering equipment according to a plan in order to make the immediate repairs of the damaged runways and to re-operate them in a record time. Intensive exercises were conducted in coordination with governmental efforts in all bases and airports for this purpose.

L. To conduct continuous photographic, lateral, and electronic air reconnaissance sorties during the period preceding the armed aggression on 1/17/1991, in which photographic documents and reports were prepared that confirmed the defensive positions of the enemy, his radars and some units and vital targets within the oblique or electronic range of reconnaissance.

Enemy's potential in the field of electronic war

48. The enemy's mobilization for the use of electronic war in his previous battles, especially the recent ones, such as the Bekaa war in 1982 and the U.S. raid on Libya in April 1986, shows that the enemy allocates one third of his effort, at least, for electronic war purposes. In addition, one third of the striking aircraft cargo is allocated to the transport of positive and negative defensive electronic war equipment. The enemy's potential in this field could be clarified as follows:

A. Early warning and command and control aircraft: They had a distinctive role in increasing the air defense effectiveness and consolidating continuous control over low altitudes. Their role is well-known in doubling the power of his air defense aircraft and attack aircraft by guiding them toward their target and providing them

with a continuous warning. The enemy had a number of ABCCCI, E-2C, E-3A, and AWACS aircraft, and other aircraft, which were able to provide a complete and uninterrupted coverage of Iraq from the locations where they were deployed, south and north of Iraq.

B. Combat jamming aircraft: A large number of EC-BO, EF111, E-A, and B aircraft capable of carrying AN/ALQ ggE jamming containers were allocated for noise jamming in order to provide a collective protection with high emission capability against all radar equipment with all their metric, decimeteric and centimetric bands. They had a clear effect since they showed on the main and lateral segments of the detection and tracking radars. The attack jamming mobilization was done through two methods which were:

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First: Escort jamming (ESCORT): The jamming aircraft would accompany the attack aircraft to provide a passage free of radar detection for the attack aircraft.

Second: Jamming from distance (STANDOFF JAMMING): The jamming aircraft remain on patrol and circle in the air 50-80 km outside the target area to jam the radar equipment meant to be affected before the entrance and exit of the attack aircraft.

C. Use of anti-radiation missiles: The enemy allocated a number of F-46, F18, A-6 and Tornado aircraft to carry anti-radar missiles, such as the U.S. Shrike and Harm and the British Arm, to handle and destroy the decimetric band radars, especially the radars tracking the Volga, Pejora, Kvadrat, OSA, Roland and Hawk missiles and the guided communication antennas, Turbo scooter and LOS. The number of missiles exceeded 3,000, and their impact was limited compared to the huge number of these missiles used for many reasons, including complicating the electronic situation in the operation region and also using of maneuver, fake transmitters, and corner reflectors. The mobilization of anti-radiation missiles was done through two methods:

First: By escort.

Second: From a distance.

D. Decoy: These are small radar targets, such as Samsun and TALD, equipped with corner reflectors or transponders to resemble a combat aircraft. The enemy allocated a number of Phantom Wild Weasel F-4G, Hornet F-18, and A-6 aircraft to carry such decoys in large numbers around the area of the target to be attacked, in order to drain and exhaust the air defense system which in turn was firing on them as if they were real aircraft. Some of these decoys were equipped with lights to exhaust the anti-aircraft weapons at night.

E. Stealth Infiltration aircraft (F-117): The enemy used 41 aircraft of this type characterized by Stealth technology known to minimize the percentage of the reflecting area of the aircraft, and to absorb electromagnetic radiation. Therefore, it is difficult to detect them from long distances with metric band radar and impossible to detect them with radars operating with other bands, which makes their handling very difficult despite the possibility to detect them from a close range because of the short available time to respond to the transmission. Also all the air defense weapons operating with centimetric bands are incapable of handling them, which gave the enemy a chance to take advantage of this matter by destroying some batteries that the anti-radar missiles were not able to suppress using the high explosive bombs with these aircraft. Additionally, these aircraft were used to shell 30% of the total targets.

F. Measures for self-defense protection of the attack aircraft: 1/3 of the effective cargo of the attack aircraft was allocated for electronic war to provide self-protection to the adversary's attack aircraft against our air defense system. For example, the A-6 aircraft which was the oldest aircraft were equipped with 2 containers of the most modern positive jamming equipment and with 2 positive jamming containers

[*repeated twice*], in addition to the negative jamming in order to affect most of our air defense circles. The self-defense against the attack aircraft is characterized by:

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First: Warnings were received in all their technologically advanced radar, thermal and laser types, which give the pilot a warning about the air defense weapons during the detection, tracking, locking and release phases, providing him with information about the direction of the threat, its type, and degree of seriousness.

Second: Positive defensive jamming containers: It's the noise and decoy jamming used for self-protection. All the attack and protection aircraft are equipped with jamming containers designed for this purpose. The guiding weapon radars had been greatly affected by this type of positive jamming, and the unsynchronized pulse jamming on the missile channel.

Third: Negative jamming designed for self-protection: The enemy used all types of negative jamming, such as the metal sheets (CHAFF), the thermal rounds (FLEARS), and electro-optic rounds (Electro optics). It is well-known that part of the metal sheets jamming, especially those designed for the centimetric and metric band radars on some of the electric networks, was most likely unintentional.

49. Our capabilities: Compared to the enemy's capability, which was quantitatively superior to ours, we also notice the following:

A. We lacked an early warning airborne system, which means:

First: The difficulty to detect the low targets.

Second: there was not enough time for the air defense system.

Third: It was impossible to introduce the air defense weapons in the proper place and at the right time.

B. There are limited numbers of attack jamming containers (ambush) mounted on the Mirage aircraft. This number of jamming containers is determined by the available air power.

C. The availability of a limited number of eastern and western anti-radar missiles in all types of bands and different quantities. This is also determined by the available air power.

D. The unavailability of decoys and unmanned aircraft.

E. The unavailability of self-protection for all of our aircraft, because of the embargo imposed on this equipment before, during, and after the Qadisiyah battle [*Iran-Iraq War*] and the Mother of all Battles.

50. Enemy's measures: Although our air defense system was old, and despite the large experience the U.S. Air Force acquired in the Vietnam war, the Arab-Zionist wars, the Bekaa war in 1982, the U.S. raid on Libya in 1986, and the Bright Star Maneuvers, the adversary coalition forces of the thirty countries undertook electronic reconnaissance measures to gather electronic information on our air defense system and, therefore, to come up with a complete assessment on our air defense including the following reconnaissance measures:

A. Satellites: A number of launched satellites were observed immediately after August 2, in addition to those that initially existed for the monitoring of Iraq and the region of operations in Kuwait. It was possible to watch them at night cruising the Iraqi space where the observatories were continuously provided with information. There were 6 types of satellites used in the espionage operation on Iraq; they were:

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- First: Early warning satellites.
- Second: Photographic reconnaissance.
- Third: Electronic reconnaissance.
- Fourth: Spying on the communications.
- Fifth: Monitoring the oceans and gulfs.
- Sixth: Navigation.

B. Reconnaissance aircraft

First: The TR-1 and U-2 aircraft were entrusted with the duty of radar and electronic reconnaissance, and also the duty of determining the presence and movement of the ground units in the region located between the Arabian Gulf shore and the Jordanian-Saudi borders with the Side-Looking Airborne Radar system (SLAR), which could detect the presence of the ground units and dispatch this information immediately to the ground and air stations. These aircraft were fulfilling the reconnaissance duty by day and by night during the period prior to the aggression. 3 aircraft of this type were seen simultaneously covering the full front of operations during the battles.

Second: The E-8 Joint Stars aircraft that were introduced to the service prior to the battle. They were among the most sophisticated aircraft in the world and used for the same purposes as the TR-1 aircraft. In addition to command and control, these aircraft could also determine the artillery locations and the results of the shelling on the battleground. They fulfill the duty of a front air observer and they are used to run large operations to help the ground units through a large cadre of airborne personnel.

Third: TR-1 AWACS aircraft with a lower altitude and less capability.

Fourth: The E-3A AWACS and E-C Hawk Eye aircraft were assigned to monitor the movement of the Iraqi aircraft and naval units.

Fifth: RC-135 and RC-130 aircraft for electronic reconnaissance and communication purposes.

Sixth: The F-16/RF- 4C and Mirage RF-1 and F-14 reconnaissance combat aircraft, which carry the TARPS system. These aircraft were equipped with electronic photography reconnaissance containers.

Seventh: Different types of pilotless aircraft. The PIONEER Israeli pilotless aircraft was observed being used from one of the battleships in the Arabian Gulf.

51. The measures we took for the confrontation: After studying the reports and the assessment of the intelligence situation regarding the capabilities of the coalition countries in the field of electronic war, and their capabilities of jamming our air defense system represented by the warning and control system, the interceptors, the anti-aircraft weapons, and the intelligence communications. For that reason, an assessment of the electronic war situation was prepared regarding the interception capabilities of the enemy in order to come out with an electronic war plan for our air defense to exploit the available technical and tactical capabilities so to minimize the effects of electronic war equipment on our air defense system on the one hand, and on our air forces on the other hand. In light of the assessment of the electronic war

situation of the adversary's air defense system, special electronic support plans were prepared, as well as plans for the support of the air movements.

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A. The measures we took for the defensive confrontation

First: Before the aggression, the measures included the following:

1. To set an electronic war plan for our air defense by using the available technical and tactical capabilities to operate in electronic war conditions.
2. To set work procedures in electronic war conditions and to make practical arrangements and practices for the combat use to all our air defense formations and units.
3. To prepare a study showing the extent of wireless and radar contraction according to the calculation of the technical potential of the jamming equipment mounted on the U.S. enemy aircraft, which could be presented in the border regions facing our country. These plans and calculations were distributed on all our air defense sectors to operate accordingly (it is well-known that the ideal use is the use of the electronic computer).
4. To train the interceptors' pilots to operate in electronic war conditions.
5. To open ground reconnaissance and jamming stations in Kuwait that can discover the Side-Looking Airborne Radar (SLAR) with the TR-1 aircraft.
6. To accomplish important projects that include:
 - A. The construction of 3 ground electronic reconnaissance stations to spot the adversary's communications and radars, their tuning with the air/air and air/ground R-834 wireless stations, and their opening according to the expected deployment of the adversary's command and control aircraft.
 - B. The manufacture of 3 jamming equipment for the AWACS radar produced during the last phases and before the aggression. These stations were opened in Al-Nkhaib, Najaf, and Nasiriyah, and there was a Saqr plan for the handling of the AWACS aircraft in cooperation with this equipment and our intercepting aircraft.
 - C. The accomplishment of Al-Nida' project, which is an Ilyushin-76 specialized aircraft in the first phase for the wireless reconnaissance and technical wireless purposes, and to locate the adversary's guidance center and missile batteries.
 - D. The manufacture of 80 fake transmitters (Mirage) similar to the transmitters of the Pejora missiles. The transmitters were distributed on the required batteries before the beginning of the adversary's attack to exhaust the adversary's anti-radar missiles.
 - E. The manufacture of corner reflectors for the protection of the Volga and Pejora missile batteries from the anti-radar radiation missiles.
 - F. The modernization and development of 10 MiG-29 aircraft for the transport of the French Remora positive jamming containers to affect the adversary's combat aircraft and the self-guided heads of the radar missiles.
 - G. The modernization of 2 MiG-23ML aircraft for the transport of the SPO-15 advanced radar warning receivers and the ASO-2V negative jamming equipment.

H. The attempt to develop the X-8 anti-radar ground missiles for the handling of the AWACS aircraft. However, the project was not completed.

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Second: Our electronic counter-measures during the aggression

1. Despite our outdated anti-aircraft radar ground jamming stations and the impossibility to distinguish the modern air radars from one another, especially the ones operating with a frequency exceeding 5 kilohertz, we were able to jam 1,547 aircraft air-radars, and we noticed a change in the adversary's radar frequency, or a turn-off of their radar or a change in the direction of their aircraft.
2. The jamming of a large number of air/air communication frequencies used by the AWACS aircraft to guide the combat aircraft by the reconnaissance and jamming systems. The jamming was effective, which led sometimes to the interruption of communication between the AWACS and the combat aircraft or the cancellation of the duty or confusion of the pilots and the damage of their aircraft. This happened on 1/17/1991 and 1/20/1991.
3. The manufacture of additional corner reflectors and their distribution on the anti-aircraft batteries.
4. Continuous field visits to the anti-aircraft formations and units, especially the batteries so they would operate in electronic war conditions.
5. The role of the ground reconnaissance stations came into light by the procurement of early warning against the adversary's aircraft and also the identification of the type of aircraft, which is an important issue in the interception of the enemy's aircraft.
6. The fake transmitters and corner reflectors played an important role in replicating the Pejora missile guiding radars and in misleading and exhausting the anti-radar missiles, which contributed to minimizing the percentage of losses to a considerable extent.

B. Our intercepting measures in the electronic war

First: Our measures in electronic reconnaissance operations: Continuous electronic reconnaissance sorties were conducted during the period going from August 2, 1990 to January 17, 1991 by using the SEARL and KKR containers on the Mirage and SU-22 aircraft and the FAO aircraft, for the purpose of collecting detailed information on the deployment of the adversary's air defense system. However, we were unable to obtain very accurate information for many reasons. These include the size of the adversary's air defense system, which was composed of different types of weapons belonging to the coalition countries and the introduction of new and sophisticated weapons operating outside the reconnaissance potential of our equipment. Also because of the continuous mobilization operating within a large theatre of operations during this period, very deep outside our electronic reconnaissance potential due to the unavailability of the line-of-sight (LOS) with the locations targeted for exploration because the reconnaissance operation was conducted at 20 kilometers deep inside our borders.

Second: The electronic support plans for the support of the air movement in which the pilots were trained were:

1. Plans for the handling of detection and control of the Saudi radars.
2. Plans for the handling of the Hawk batteries, south of Kuwait.
3. Plans for the handling of the anti-aircraft weapons detection and guidance radars against the air targets in the Arabian Gulf region.

Third: The following was achieved:

1. The modification of 20 MiG-23 BN aircraft, so they would carry the SPO-15 radar warning receiver and the ASO negative jamming equipment.

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2. The manufacturing of 50,000 negative jamming shots in cooperation with the Military Industrialization Commission for the support of weapon storage.
3. The training of pilots on the manner of detecting the Hawk missiles with the radar warning receivers, on how to jam them and use the maneuvers to break the lock.
4. To brief the pilots on electronic war equipment with which the enemy's aircraft were equipped and the manner to take advantage of our equipment to affect them.

Lessons Learned and Recommendations

General superiority coefficient

52. The air superiority which the adversary's coalition was able to acquire is a consolidation of the principles and a lesson learned since World War II, and was applied in many subsequent wars. This lesson confirms that the air superiority is one of the main factors to settle a modern battle, especially if the superiority coefficient is very high.

Air defense

53. Because of the air defense effectiveness during the first days of the battle, the enemy was forced to change his air attack methods several times, including the switch to air attacks at medium and high altitudes during the day, and then during the night to avoid the losses he incurred from the different air defense weapons at a low altitude. Therefore, the enemy was forced to allocate a considerable part of his air power to the self-protection of his attack aircraft.

54. The assimilation of the system, the knowledge of the enemy's methods and capabilities, in addition to the belief in fairness of the cause, high spirits, and the presence of the will to fight enabled the combat crews of the air defense systems to continue fighting the adversary's aviation, despite the raids, difficult weather conditions, and exposure of the fighting crews to the direct adversary's air shelling for 42 days without interruption.

55. In order to better withstand the intense air raids with a high technical effectiveness, there should be an efficient air defense at medium and high altitudes similar to the air defense available at low altitudes in different weather conditions, with the capability of simultaneously engaging several targets in intense electronic war conditions.

56. The aircraft dedicated to the air defense purposes should be equal or superior to the combat aircraft of the attacking nations with regard to radar detection ranges, the tracking capability and weapon firing ranges. The MiG-25 aircraft enjoyed the above characteristics of attacking and downing a number of enemy combat aircraft despite the enemy's air superiority.

57. The limited capabilities of the air defense weapons allocated to the protection of the headquarters and vital projects inside Iraq as a whole, in addition to what was

taken from it in order to protect the ground troops in the region of Kuwait, encouraged the enemy to continue his air raids due to the lack of protection allocated to these targets. Therefore, there should be a certain reserve of air defense weapons to be able to bring back achievement and reinforcement.

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58. Maneuvering with weapons, equipment, and command locations proved to be efficient against the adversary's aviation by making it miss the opportunity to destroy these weapons, equipment, and headquarters and to be taken by surprise from locations it had been impossible for the enemy to explore ahead of time. Thus, these weapons and equipment should be able to maneuver by providing the requirements of transportation, reinforcement, and communications, or we should seize automatic air defense weapons and instruments.

59. The enemy used the most sophisticated weapons, including guided ones and reinforced-buildings piercing ones. Some of these weapons were manufactured at the end of 1990, which required the consideration of negative defense measures that rely mainly on reinforcements. In other words, the negative air defense measures should not be limited to one single measure but on a series of measures, including the large-scale deployment, camouflage, trickery, and taking advantage of the nature of the terrain for this purpose.

Command and control

60. The reason the command and control system of the Air Force and Air Defense Command keeps on operating in different conditions of aggression despite our limited capabilities compared to what the coalition enemy possesses, is because all the plans included the operating procedures and conditions where the communications would be interrupted. The most important plans were the reinforcement of the capability of a decentralized work, the establishment of the required procedures for this purpose, and the continuation of training on them since we realized that the enemy would target, among his first priorities, the main circles of our communications system to paralyze the command and control system.

61. Our war in the Mother of all Battles has brought particularly into light the importance of possessing a complete and consistent system of control, command, communications, and exchange of information, where the enemy was able through his possession of such a system, to manage large-scale air operations with a large number of aircraft and to achieve quick reaction toward the recent situations. It is well-known that the airborne warning and command system AWACS played an important role in this field as well as the use of satellites and sophisticated communications that have a high capability of absorbing and fighting the jamming.

62. The main element to guarantee the continuity of an efficient command and control is the availability of diversified communications, especially the wired ones, which would be able to resist the adversary's air bombardments and would have the capability of a quick response, in addition to their capability of operating, of being independent, and with multiple sources. It should also be taken into consideration the procurement of movable equipment and switchboards to compensate the damages and the possibility of moving them to secure places specified in advance. As to the wireless equipment, they should have a high resistance to jamming.

63. With regard to organizing the command, staff officers, and their operations, the war experience highlights a number of requirements needed to guarantee the continuity of command and control over the combat formations and units. The most important requirements are:

- A. To maintain a close connection between the three forces of our armed forces in all the phases of planning, preparing, and executing to guarantee advance cooperation and good preparation for the operations.
- B. It's necessary to have alternate staff panels available to engage more than one alternate command location.
- C. The possibility of a decentralized work in case of interruption of communications.

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D. To create a communication center for technical and administrative support between the vital formations and the staff panel of the command of the administrative and technical Air Force, to avoid its interference in the activities of the operations center of the Air Force and Air Defense.

E. The availability of alternative means to dispatch the orders and information in case the communications are interrupted, and to confirm them within the war cadres (personnel and vehicles).

Electronic war

64. The Mother of all Battles revealed clearly the importance of the role of electronic warfare, especially on the part of the adversary, and confirmed that it doubled, indeed, the power of achievement due to the duties achieved with high performance and the minimum amount of possible losses. Therefore, the electronic warfare performance should be technically and tactically promoted in quantity and quality.

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