

US AIR STRATEGY IN GULF WAR

**Dissertation submitted to
Jawaharlal Nehru University
in partial fulfilment of the requirements
for the award of**

MASTER OF PHILOSOPHY

R. GOWTHAM RAJA SATHISH

**Disarmament Division
Centre for International Politics
Organisation and Disarmament Studies
School of International Studies
Jawaharlal Nehru University
New Delhi - 110 067**

2000



CENTRE FOR INTERNATIONAL POLITICS, ORGANIZATION & DISARMAMENT
SCHOOL OF INTERNATIONAL STUDIES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI - 110 067

Gram : JAYENU
Phone : 6107676, 6167557
Extn.: 2349
Fax : 91-11-6165886

Dated July, 2000

CERTIFICATE

This is to certify that the dissertation entitled "US Air Strategy in the Gulf War" submitted by R. Gowtham Raja Sathish in partial fulfillment of the requirement for the award of the degree of **MASTER OF PHILOSOPHY** of this university, has not been previously submitted for any other degree of this or any other university. To the best of our knowledge, this is a bonafide work.

We recommend that this dissertation be placed before the examiners for evaluation.


Dr. Amitabh Mattoo

(CHAIRPERSON)

Chairperson
Centre for International Politics,
Organization and Disarmament
School of International Studies,
Jawaharlal Nehru University,
New Delhi - 110 067


Dr. Kanti P. Bajpai

(SUPERVISOR)

DEDICATED
TO
MY PARENTS

My Acknowledgements are due to

-- my supervisor Dr. Kanti Prasad Bajpai for guiding my maiden 'research' work; for his patience against my numerous failings and lapses during the entire process of my dissertation writing.

-- our Centre chairperson Prof. Amitabh Mattoo for being the admirable guiding force for all his students.

-- my mentors and teachers without whose encouragement it would not have been possible for me to reach where I am today. For my present interest in the area of defence and strategic studies, I am grateful to Prof. Raghunandan Swarup and Prof Gopalji Malviya of the University of Madras and to Dr. Lawrence of Voorhees College, Vellore,

-- my class-mates and colleagues Pooja, Rajiv, Chandrajeet and Vikas for being great confidants, comrades and colleagues. Their help and understanding have made my stay in JNU affable throughout. A big 'thank you' to you all.

-- my friends and confidants Shailendrakumar, Thirunavukarasu, Sundarababu, Peer Mohideen(the new doctor on the block), Somshankar, Parivelan, Benarji, Vickram and Nagong, needs a special mention here. Their trust, confidence and reliance have made the going smooth always. They have provided the warmth and comfort of a home away from home. I appreciate their efforts in all that they have done for things I never had time for specially during the tense hours of 'this' submission.

-- Late Mr. R. Sitaraman for being a spring of warmth and comfort and a source of valuable counsel during my initial days in all 'new' Delhi. I also express my appreciation to my confidant Mr. R. Neelakantan.

-- my uncle Sathish for being there always, at times good and bad, for being the ideal friend one looks for in life and of course his resourcefulness.

-- my brothers Vinodh and Pradeep; to Deepa my sister for providing me a place of high-esteem. I love you all for the respect and adulation that you have showered on me over the years.

-- last but never the least, it is to my parents that I owe everything that has put me where I am today. I value them for shaping my life and it is to them that I dedicate this work of mine.

However, the errors that remain are entirely mine.

Gowtham

CONTENTS

Page No.

	INTRODUCTION	1-10
Chapter -1	AIR POWER IN HISTORY	11-33
Chapter - II	PLANNING THE AIR STRATEGY IN THE GULF WAR	34-57
Chapter - III	AIR OPERATIONS IN THE GULF WAR	58-85
	CONCLUSION	86-97
	BIBLIOGRAPHY	90-97

INTRODUCTION

Since the advent of the aircraft, the airfield substituted increasingly for the ground and water. With the growing importance of air power, the strategies of air power also became a key part of strategic thinking. "Air Power" as defined by Richard P. Hallion, denotes the "various uses of air-borne vehicles and forces to achieve national needs by the projection of military power or presence at a distance"¹. In the context of military power and as distinct from land and sea power, air power denotes the ability to project military force from a platform, above the ground.

Air power, the dominant factor of modern warfare emerged with increasing prominence as an instrument of national policy and strategy. Air power strategy has assumed greater significance as it has come to be realised that a hostile army in the battlefield is a false objective and the real objectives are the vital strategic centres, which enable the enemy to have the will to wage war. Air power enables the use of air for one's purpose, simultaneously denying the same to the enemy. It also does not have to rely on either army or navy for strategic or tactical access.

In the present day context of war fighting, air power assumes greater importance and significance in terms of the role it could play when compared to that of army and navy.

¹ Richard P. Hallion, *Storm Over Iraq*, (Washington, 1992), p.4

In modern conventional warfare, air support has become an essential prerequisite for a successful land or sea battle. Air power is not only critical for battlefield success but also to the battlefield survival, because in case of an air invasion only a strong and efficient air force will be able to counter it. It should be noted too that, it is more often effectively utilised by the technologically advanced nations, which are capable of exploiting the air, against weaker opponents. The Persian Gulf War 1990-1991 is a classic example of such a case.

The Persian Gulf War (1990-1991), the first major international conflict in the aftermath of the cold war, demonstrated a major transformation in the nature of warfare. Air power played a crucial role in the Gulf War and it was a victory of Coalition air power projection by armies, navies and air force. In a way, the Gulf War is even distinct from the Second World War because in the Gulf War there was little or no air combat at all, the bombers without any hindrance were free to operate and conduct strike missions. Moreover, stealth aircraft, radar homing missiles, and cruise missiles also added to the complete freedom of the Coalition air force over the Iraqi skies. Another feature of the Gulf War which did not prevail in the Second World War was the use of sophisticated target finding and guidance technologies supported by Global positioning system (GPS) satellites.

The exaggerated expectation, which had prevailed since the beginning of air strategy, that air power alone can win a

war, was once again raised in this war. The idea that air power alone can win a war, itself has evolved from the older concept that bombardment of a country's vital strategic centres and civilian population would undermine civilian and military morale and shatter the enemy's will to resist, which in turn would drive the enemy in to submission. During the planning stage of the strategy for Gulf War, air power advocates hoped that a concentrated strategic air campaign against Saddam's political, economic and military centers would force Iraq to withdraw from Kuwait without resorting to ground warfare. Though these objectives were never achieved the use of modern technology, especially precision, permitted the pursuit of specific military objectives such as disabling the targets rather than destroying them.

During Operation Desert Shield the US led Coalition forces established a defensive capability in the Gulf theater primarily to deter Saddam Hussein from continued aggression, to build and integrate Coalition forces, to enforce sanctions, to defend Saudi Arabia and to defeat further Iraqi advances, if required. The overall strategy of 'Operation Desert Shield' was based on deterring Iraq and delaying and disrupting Iraqi advance to facilitate the rapid deployment of the Coalition forces. To support the deterrence mission, an air option was developed to conduct a strategic air campaign against key offensive and defensive military capabilities of Iraq. This air strike mission code named 'Operation Desert Storm' was planned to include air power as a deterrent as

well as an offensive force. Operation Desert Storm entailed a four phased application of air power which aimed at destroying Iraq's integrated air defence system, suppressing Iraq's air defence in the Kuwaiti Theater of Operations (KTO), isolating Iraqi army in the KTO and providing air support to the Coalition ground forces. Operation Desert Storm was designed in such a way, not only to evacuate Iraqi forces from Kuwait but also to eliminate the Iraqi threat to the entire Gulf region.

The overall strategy of 'Operation Desert Storm' air campaign was based on achieving five strategic goals, that is, (1) to isolate the Iraqi leadership, (2) to gain and maintain air superiority, (3) to destroy the known Iraqi nuclear, chemical and biological (NBC) weapons capability, (4) to destroy Iraq's offensive and defensive military capabilities and (5) to render the Iraqi army in Kuwait ineffective. Accordingly, the air campaign was designed to paralyse Iraq's ability to maintain its occupation of Kuwait and liberate Kuwait from the clutches of Iraq. It aimed at destroying Iraq's war making potential, that is, to destroy Iraq's nuclear, biological and chemical (NBC) weapons research, production and storage facilities, scud missiles and their stock sites, mobile and fixed scud missile launchers and render Iraqi forces ineffective as a fighting force. This was expected to eliminate most part of the threat posed by Iraq to the entire Gulf region. The air campaign also focused on Iraqi air and ground forces including Iraqi combat aircraft, Iraqi artillery, tanks,

armoured vehicles, and so on, the purpose of this was to minimize the casualties to the Coalition ground forces, when the ground offensive started. The Coalition forces also aimed at minimizing civilian casualties and collateral damage to Iraqi society. To achieve this, the Coalition forces very much relied on precision guided weapons.

Stealth weapons also figured prominently in the entire air campaign. With advanced stealth fighters like the F-117As, the Coalition could plan one strike across entire Iraq hitting the widest span of targets. The unique feature of the stealth fighter is that unlike the conventional aircraft it does not require any support aircraft like F-4G Wild-Weasel electronic warfare jammers and other air defence suppressers, to accomplish its missions.

To destroy Iraq's integrated and hardened air defence network the Coalition air force employed F-117A stealth fighters, airforce and navy cruise missiles and special operations forces; EF/-111A and EA-6B electronic warfare aircraft, F-4G radar killers, F-15s, F/A-18 A/C, E-111F, A-6E and Tornado GR-1 strike air craft, F-15C air superiority fighters. Along with this, Tornado F-3, Saudi F-15A and Navy F-14A fighters, were also used to achieve early air superiority.

As the highest priority of the air campaign was to establish air superiority over the Iraqi skies, the Coalition air forces had to encounter and destroy Iraqi fighters and interceptors, suppress Iraq's surface to air (SAM) missile and

anti-air craft artillery (AAA) sites and destroy Iraq's Franco-Soviet-British based air defence network which included early warning and surveillance radars, command and control facilities, communication and computer links and electrical power supply. It was estimated that the Coalition air forces would have to encounter "over 700 Iraqi fighter aircraft 7000 anti-aircraft guns, 7000 radar guided missiles and 9000 heat seeking missiles"², on the very first night of the operation.

Phase I of Operation Desert Storm started with coordinated air attacks from both, air and sea based sources, which simultaneously attacked several Iraqi key targets, intending to eliminate the integrated Iraqi air defence system. The early achievement of air superiority facilitated the conduct of continuous air strikes with non-stealth aircraft against the complete range of targets. Stealth aircraft and cruise missile supported the Coalition forces to keep continuous pressure on the Iraqi leadership and its command and control nodes.

Phase II of the Coalition air campaign which intended to suppress enemy air defences in the Kuwaiti Theater of Operations (KTO) was estimated to take only a day or two because the air defences in Kuwait were neither numerous and dense nor as secured as those in Iraq. This was supposed to be followed by the Phase III attacks which focused on the Republican Guard forces in Kuwait and

²

Michael J. Mazarr and others, *Desert Storm*, (Boulder, 1993), p.93

southern part of Iraq and the Iraqi forces in Kuwait. The Coalition high command, rather than driving out the Republican Guard forces from Kuwait, intended to confront them and destroy them in the Kuwaiti Theater of Operations. Later, to evacuate the rest of the forces in Kuwait, the Coalition targeted the Iraqi headquarters in Kuwait, command and control facilities, Iraqi troops, tanks and artillery.

Technology and sophisticated weapon system along with air power strategy had an enormous effect on the conduct and outcome of the war. While some of the equipment, weapons and munitions deployed by the US, in the war were already tested and combat proven, others such as the F-117A stealth fighters and Patriot anti-missile missiles were for the first time used in war. Space systems including Global positioning systems (GPS), Communication satellites and meteorological satellites proved to be crucial to the support of a variety of military operations from detection to battle management.

The performance of the weapons system deployed in the Gulf War were also influenced by a number of factors such as weather conditions, the nature of desert terrain, employment criteria (e.g., rules of engagement (ROE), altitude restrictions, attempts to minimize collateral damage), munitions capabilities and Iraqi capabilities and tactics. For a variety of purposes, air operations included F-117A stealth aircraft,

F-16 C/D Fighting Falcons, F-15E air superiority fighters, F-4G Wild-Weasel electronic warfare jammers, F-111Fs, EF-111A Ravens, A-6E intruders, F-14A+ Tomcats, F/A-18 A/C Hornets, Jaguars, B-52G Stratofortress bombers, Patriot anti-missile missiles, chemical warfare protection, Tomahawk land attack missiles (TLAM) and unmanned aerial vehicles (UAVs) or remotely piloted vehicles (RPVs).

In this dissertation an attempt is made to closely look at the Gulf War strategy in the light of the classical theories of air power and trace the relevance and effects of air power theories in the planning of the air strategy. It also attempts to focus on the air operations in the Gulf War and the accomplishments of air power in the Gulf War. An attempt is also made to answer the following research questions:

What were the accomplishments of air power in the Gulf War?

What were the implications of the early achievement of air superiority in the Gulf War?

What was the role of the support aircraft in the Gulf War?

What was the role of technology in enhancing the Coalition air power in the Gulf War?

What was the role of anti-missile missiles?

The first chapter of the dissertation titled "Air Power in History" focuses on the evolution of air power and its inception in warfare. It also focuses on the meaning and various concepts of air power. This chapter also includes a brief outline of the thoughts of eminent air power theoreticians like Gen. Guilio Douhet, Gen. Hugh M. Trenchard and Gen. William Mitchell. It also focuses on the recent developments in flexibility, range, penetrative ability of aircraft, fire power, accuracy, air refueling facilities and so on.

The second chapter titled "Planning the Air Strategy in the Gulf War" focuses on the UN Security Council resolutions, UN policy objectives in the Gulf War and the planning of the 'Operation Desert Shield' and 'Operation Desert Storm' air operations. This also focuses on the UN sanctions on Iraq, the Coalition deployment in the operational theater and other air operations of 'Operation Desert Shield'. This chapter also highlights the Iraqi threat and other factors based on which the air strategy was planned. It focuses on the Theatre campaign plan and Air campaign plan in the Gulf War. It also focuses on the relevance of air strategies in the air campaign plan.

The third chapter titled 'Air operations in the Gulf War' focuses on the actual air operations in the four phased air campaign of 'Operation Desert Storm' and the accomplishments of air power in the Gulf War. It focuses on

the various challenges faced by the Coalition forces during the campaign, such as, weather conditions, employment criteria (e.g., rules of engagement (ROE), altitude restrictions, attempts to minimize collateral damage) and so on. It also briefly highlights on the Scud missile campaign. This chapter focuses on the role of technology in the Gulf War.

CHAPTER I

AIR POWER IN HISTORY

Evolution of Air Power

For centuries, man who had been earthbound had always yearned to fly. Man's aspirations to exploit the air can be traced back to the myths of ancient legends where gods with wings make romantic sorties in the air. Man's desire to fly remained a distant dream until the end of the eighteenth century, when hot air balloons were invented. These balloons provided man with a sort of uncontrolled means of aerial transport. In 1783, Joseph Montgolfier, a French paper manufacturer, devised the first man-carrying balloon. In 1852, Henri Giffard devised the first powered airship. Subsequently in 1903, two brothers Wilbur and Orville Wright invented the first powered airplane. They made the first powered flight in their fragile airplane on 17 December 1903, near Kitty Hawk in North Carolina. In order to fly man had converted the automobile engine and ships propeller and adopted for his vehicle the shape of the bird. In the early stages, "fragile air craft which were only playthings of wealthy sportsmen",³ were seriously pursued and developed only by few sincere mechanics.

"Long before the advent of the aircraft", writes Basil Colier, "poets and philosophers had warned mankind about

³ Eugene M Emme.,(ed.) *The Impacts of Air Power*, (New Delhi,1977) p.1

the perils to which the innocent would be exposed, if the wicked could attack them at pleasure from the sky".⁴ Francisco Lana Terzi, an Italian Jesuit priest, pointed out in 1790 that, "the occupant of an airship would be able to escape unscathed after dropping missiles which could capsize ships or damage buildings".⁵ He declared, "God would not suffer such an invention to take effect by reason of the disturbance it would cause to civil government of men, for who sees not that no city can be secure against attack".⁶

In 1908, H.G. Wells foresaw that the air power of nations would revolutionize the conduct and as well as the social consequences of war. He considered air war to be a universal guerilla war, which involves cities and civil population as well. In 1914, he even foretold that the power of nations to use the air would be raised to a decisive role by an atomic bomb. In spite of all these forethought and prophecies about the military application of air power, immediately after the advent of the air craft, its military potential was neither visualized nor realized even by the most thoughtful military planners. England, the spiritual homeland of global sea power, which had almost totally lost its geographical immunity because of aviation, was the first country to appreciate the revolutionary impact of aviation. Only after England, Germany and France recognised the

⁴ Basil Collier, *A History of Air Power*, (London, 1974), p.1

⁵ Ibid p.1

⁶ Eugene M. Emme (ed.), *The Impacts of Air Power*, n.3, p.4

military importance of air power. Later, it was followed by the United States, nearly after a decade.

Military Application of Air Power

The use of aircraft for warlike purposes had neither begun with the airplane nor with the airship and not even with the balloon. It had begun with Chinese kites. About 2,300 years ago, the Chinese are believed to have used huge man-lifting kites for reconnaissance purposes. The Chinese are also believed to have used self-propelled ballistic missiles as weapons of war. These rocket arrows which were used by the Chinese in 1232, against the Mongols were rockets stabilized by fins.⁷ The usage of kites and rockets is believed to have reappeared in Europe in the middle ages. In the middle of the fifteenth century, rockets, which were not so accurate, had been used as siege weapons in Europe. And after this rockets which had been abandoned for many years, reappeared during the Second World War in many forms like the surface to surface, air to air, air to surface, and surface to air rockets.

Hot air balloons were used for the first time in war in 1849. The Austrians are believed to have used small balloons each tied with small time-fused bombs to attack Venice. But, most of the balloons went astray and only a few reached the target, while some of them were blown back over the Austrian

⁷ Basil Collier, *A History of Air Power*, n.4, p.1

lines itself. Air ships or zeppelins were first developed and used in war by the Germans. The Most notable use of airships in war is the raid of the German "Gotha" bombers over London in 1916-17, which proved quite destructive. Airplanes were first extensively used in war in the Italian Tripoli campaign of 1911-1912. At first Airplanes were employed by Italy for reconnaissance over the Turkish troops in Azizia, but later hand grenades were dropped on two Libyan Cities. However, for the most part, initially the airplane was considered a tool for reconnaissance which could serve as the eyes of the ground forces and it proved to be so successful that it became important for both the sides to destroy those used by the other. "The obvious value of overhead intelligence" writes Richard P. Hallion "and the danger of allowing enemy air craft to penetrate one's air space led to the introduction of the first rudimentary fighters in 1915".⁸ But, as early as 1911, the British aviators have experimented with the use of aircraft for torpedo attack; they had tried hunting submarines with planes in 1912 and they had experimented with bomb dropping, wireless telegraphy, machine gunnery and fighting. Along with this, the pace of aeronautic progress was greatly prodded by bloody conflicts among the nations. Eventually, airplanes were continuously improved in respect of reliability, range, speed, altitude and load carrying capacity. And as the range and reliability of the

⁸ Richard P. Hallion, *Storm Over Iraq*, n.1, p.5

aircraft increased with technical progress, air parity emerged as a vital factor.

Concepts of Air Power

Air power may be defined as the extension of military power projection in the air by means of aircraft and projectiles with supporting facilities. Gen. William Mitchel, one of the early exponents of air power, defines it as "the ability to do something in the air " and that "it consists of transporting all sorts of goods from one place to another, as air covers the whole world".⁹ Alexander Seversky, another proponent of air power, defines it as "the sum total of a country's ability to use the air and aero-systems for securing and preserving the national security interest".¹⁰

In defining air power, military experts have invariably paraphrased the historic definition of sea power, maintaining that air power includes a nation's airforce, the military aviation of other services, its civil aviation and civil air transport systems, its aircraft industry and the aeronautical skills of its population.¹¹ Initially air power was broadly defined as the total ability of a nation to fly, to act through air space and to use controlled flights for the purpose of war, which also included the ability to deliver cargo, weapons of

⁹ Gen. William Mitchell, . "The Development of Air Power" in Eugene M. Emme (ed.), n.3, p.171

¹⁰ Maj. Alexander, P.de Seversky, "What is Air Power?" in Eugene M.Emme (ed.), n.3, p.204

¹¹ Ibid p.203

war and other elements of war making potential, through air, to a desired destination and accomplish desired missions. Later, it was narrowed down to a strict military meaning and defined, "as the ability of a nation to assert its military will via the medium of air".¹² Later, it was simply defined as the sum total of the entire war machinery of a country which operates through the medium of air.¹³

Until the advent of the aircraft, the army and the navy had been the ultimate military expression of national military power on land and sea, respectively. But, air power belied this by making the battlefield irrelevant even in the midst of sophisticated air defence systems by carrying the battle to the enemy heartland. In the context of military power, air power assumes greater significance in terms of the role it could play when compared to that of navy and air force. As distinct from land and sea power, air power denotes the ability to project military force from a platform in the third dimension above the ground. Air power enables the use of air for one's own purposes and simultaneously denying the same to the enemy, it also does not have to rely either on army or navy, for strategic or tactical access. However, air power does require the close cooperation of both land and sea forces for some special operations.

¹² Ibid p.201

¹³ S.N.Rampal, *Air War*, (New Delhi, 1998), p.4

The most important components of air power, apart from the economic, scientific and industrial capacities of a nation, includes air craft, air weapon systems including missiles, fitments, delivery systems and operational platforms, radar and communication, training and maintenance facilities, air intelligence, planning and administration, logistics and supply, and a host of auxiliary services like aviation medicine, aerial mapping and photographic services.¹⁴ Ever since the inception of aircraft in warfare, certain distinct factors like flexibility, mobility including range, speed and penetrative ability and firepower have been identified as the basic characters of air power. Flexibility connotes the versatility of the aircraft in their movements and operations and the ability of the air forces to instantly reach the warfront, at short notice. In terms of concentration of force, air power is so flexible that in application a single aircraft operating from one base can attack diverse targets and in the same way many aircraft operating from different bases can attack the same target. The next important factor, mobility connotes the speedy delivery capacity of airplanes. Mobility assumes importance as selected forces are to be moved swiftly at extremely short notice to operate in new locations without permitting the enemy to take up defensive positions. Range is another important factor. The aircraft should possess sufficient range so that it could penetrate deep in to enemy territory and

¹⁴ Jasjit Singh, *Air Power in Modern Warfare*, (New Delhi, 1988) p.xvi

attack the cities and other strategic targets. Today, with the development of supersonic aircraft and mid air refueling facilities, the range of aircraft have been increased and most of the modern aircraft can cover a range of more than 10,000 miles without a break. The first operational supersonic fighter, " F-100", Sabre jet of the USAF, introduced in 1954, had a maximum speed of 846 mph at an attitude of 35,000 ft, with a range of 1,500 miles.¹⁵ The weapon systems, including the missiles, should also possess sufficient range so that it enables the aircraft to operate in standoff positions, which ultimately contribute to aircraft survivability. Speed refers to the swift movement of the aircraft, that is, the aircraft should be able to fly and hit the target located anywhere and also be able to penetrate enemy defences and carry out strategic bombing. Modern aircraft, unlike the ones conditioned by piston engines and propellers, posses high penetrative ability owing to the development of jet engines, which removed almost all the restrictions on aircraft speed. The test flight of the 'Bell X-2' aircraft of the US, made of heat resisting steel, flew at a maximum speed of 3.2 mach or 2,094 mph, which is three times greater than that of the speed of sound.¹⁶ Speed provides aircraft with the required penetrative ability at a desired altitude to utilize a wide range of tactics.

Firepower is another important factor of air power. For a successful bombing mission, the aircraft should posses the

¹⁵ *The Encyclopedia of Air Warfare*, (London, 1979) p.198

¹⁶ *Ibid* p.190-191

maximum powered weapons possible. According to Gen. Guillo Douhet "the efficacy and the destructive capacity of the bombs should be increased as much as possible because the fire power is directly proportional to the offensive power of the air force".¹⁷ Fire power added with precision would reduce the amount of fire power required to hit a target and also would produce dramatic results. The accuracy of these weapons should also be increased so that the target attacked should be destroyed in one go. Because in air warfare attacking the same targets more than once is not advisable and is very risky. The recent modern jet propelled aircraft, rockets, pilot-less aircraft, precision guided missiles and other new systems which are controlled by radar proximity fuses and other direction finding electronic devices can display terrific shock effects both dynamic and psychological, leading to destruction and disruption far in excess of the actual damage imposed.¹⁸

Strategies of Air Power

Since the advent of the aircraft, belying the land and sea forces airforce has become the principal element of war. In almost all the wars of the twentieth century, including the two World Wars, air power had played a vital role and in many it has been the most decisive factor. "For the first time

¹⁷ Gen. , Guilio Douhet, "The Command of the Air", in Eugene, M. Emme,(ed.), n,3, p.169

¹⁸ Jasjit Singh, *Air Power in Modern Warfare*, n.13, p.xix

in the age old history of warfare," writes Eugene M. Emme, "the science of flight has made it possible for the major powers to strike directly at the heart and nerve centres of each other".¹⁹ According to James L. Cate, "the advent of air power which can go to the vital centres of an enemy and entirely neutralise or destroy them, has put a completely new complexion on the old system of war."²⁰ Air power had made a revolutionary impact on war by carrying the battle deep in to the enemy territory. The older concepts of borders and coastlines are not applicable to the air because air covers the whole world and "no nation has aerial shores". Air power does not know any boundaries because unlike the land and sea forces, its operations can not be impeded by natural formations and concrete fortifications. Eventually, air power as the dominant factor of modern warfare emerged with increasing prominence as an instrument of national policy and strategy. Air power is quite often effectively utilised by the technologically advanced nations capable of exploiting the air, to win against weaker opponents. With the growing importance of air power, strategies of air power also started commanding prime concern on strategic doctrines. Air power strategy assumed real significance as it has been realised that the hostile army in the battlefield is a false objective and real objectives are the vital strategic centres, which enable the enemy to have the will to wage war.

¹⁹ Eugene M.Emme ,(ed.) *The Impacts of Air Power*, n.3, p.155

²⁰ James L.Cate, "Development of United States Air Doctrine:1917-41", in Eugene M. Emme (ed.), n.3, p.189

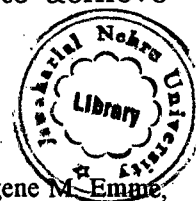
THS 763

A survey of strategic thoughts on air power suggest that the bulk of classical air power doctrines were developed during the First World War, however its origin lies in the pre-1941 period. Unlike sea power, air power neither developed gradually nor it had any traditional background. So, compared to sea power there has not been much work done on air power and those who attempted to do so were also very few. Among the most notable air power theoreticians were Gen. Giulio Douhet of Italy, Hugh M. Trenchard of Britain and Gen. William Mitchel of the United States. Though all these air power thinkers propounded theories based on the strategic position of their own countries, they had many common perspectives. They strongly believed that air power would subdue the land and sea power and become the dominant military arm of the future. They were one in believing that a nation's will to wage war could be destroyed by air attacks if mounted properly.²¹ The modest suggestion of almost all the proponents of air power was that the role of air force is to attack the whole of the enemy structure.²² By the First World War, four fundamental ideas of air power were formulated in Britain.

196
10
First, air power could contribute enormously to land and naval operations. Second, the command of the air was so essential as was the command of the seas. Third, to achieve

²¹ Eugene M. Emme (ed.), *The Impacts of Air Power*, n.3, p.156

²² James L. Cate, "Development of United States Air Doctrine: 1917-41", Eugene M. Emme, (ed.) n.2, p.189



the command of the air, an independent air force needed be established. Fourth, the air force could reach far beyond the battle lines and strike the targets deep in to enemy territory.

Based on these ideas Gen Hugh M. Trenchard, the first Marshall of the Royal Air Force, set out four principles for the effective use of air power, which provided the bottom line of the principles of air warfare. Almost all the air strategies surround only these four principles.

First, to obtain air superiority and continuously fight for it. Second, to destroy the means of enemy production and communication networks by strategic bombing. Third, to maintain the battle with reinforcements and necessary supplies and without any interference by the enemy.

Fourth, to prevent the enemy being able to maintain the battle by preventing him to build up adequate supplies for his army, navy and air forces.

According to air power theoreticians, the aircraft is the most versatile and flexible offensive weapon beyond compare. And as the nature of air power itself is offensive, the strategies of any form of air mission are and should also be offensive, that is, the planning of any air mission, even if it is defensive, should have the initiative. Almost all the proponents insist on initiative in planning the operations, because the defensive side will not know where the attack is going to be and will also be forced to scatter it's forces to all

its vulnerable points. This provides the offensive side with the advantage of concentrating its maximum force at any point since all enemy posts will be weak and thinly defended.

However, selection of targets is another important factor in air warfare. For Gen. Douhet, "the selection of the enemy targets in aerial warfare is the most delicate operation and no hard and fast rules can be laid on this aspect."²³ Gen. Douhet states that "it is even impossible to outline general standards because the choice of enemy targets will depend upon a number of circumstances material, moral and phsycological."²⁴ So, in spite of preset targets, the pilots also should be allowed to choose the targets they find suitable.

In conventional warfare, air power strategy denotes the art of using air power components with specific missions in order to maintain the overall objectives of war. The strategy to carry out a successful air operation is based on deception of the enemy, dispersal of his defences, exploitation by surprise and concentration of forces. For the successful execution of any air strategy the first and the foremost step is to establish air superiority or the command of the air. Air superiority is a condition where one side is free to exploit the air at its will while the enemy is denied the same. Gen. Douhet refers to it as "a condition where the enemy air activity is nullified by preventing him from flying or from carrying out any aerial

²³ Gen. Guilio Douhet, "The Command of the Air", Eugene, M. Emme (ed.), n.2, p.168

²⁴ Ibid.

action at all.”²⁵ According to Major Seversky, “freedom of air navigation maintained by one side through successful and sustained combat is known as air superiority.”²⁶ Trenchard makes it simpler by stating that “it is essential to control the air before we can operate effectively on land, on the sea and in the air itself.”²⁷ So, in air warfare, air superiority occupies top priority. To achieve this, “the primary mission of the airforce is to eliminate the enemy air force by destroying its operational facilities on the ground and as well as in the air, in order to deprive the enemy of his retaliatory capacity.”²⁸ The enemy air forces should be caught at their most vulnerable moment when they are taking fresh fuel and ammunition and re-servicing.²⁹ The second mission of the air force is to provide protection for all its land and sea forces and also to assist them in their operations. Only after achieving air superiority, can the air forces attack the other strategic targets in enemy territory, which cater for the enemy war machine. These targets which support enemy morale could be destroyed only by air power, that is by strategic bombing. The best way to paralyse the enemy armed forces is to destroy or

²⁵ Edward, M.Earle, (ed.), *Makers of the Modern Strategy*, (New York, 1971), p.498

²⁶ Maj. Alexander, P.de. Seversky, “ What is Air Power?” in Eugene, M. Emme (ed.), n.3, p.201

²⁷ Gen. Hugh M Trenchard, “Air Power and National Security”, in Eugene M. Emme, (ed.), n.3, p.193

²⁸ Maj. Alexander P.de. Seversky, “ What is Air Power?” in Eugene, M. Emme (ed.), n.3, p.202

²⁹ Maj.Gen. Max Wever, “Doctrine of the German Air Force”, in Eugene, M. Emme, (ed.), n.2, p.184

cripple the war industry and stop production in the armament factories.

The strategic air mission or strategic air campaign implies the destruction of ground targets, which has strategic importance by strategic bombing. The strategic air mission aims at destroying important targets located deep in the enemy heartland, such as, important cities, industries which cater for war needs, fuel dumps, military and strategic force installations, electric power systems, strategic surface transport junctions and disrupting communication networks, enemy supply lines and so on. Bombardment of these targets are vital in air warfare because destruction of such targets would shatter enemy morale and instantly would bring the war to an end. The biggest advantage of strategic bombing lies in hitting the enemy's nerve centres at the very beginning of the war so as to paralyse them to the greatest extent possible. In air operations the same method must never be used twice because systematic thought and action are the death of air strategy. The bomber aircraft and the ballistic missiles are supposed to be the well-known strike forces of this mission.

There are two different methods of strategic bombing. One is the precision bombing or specific bombing and the other is terror bombing or general area bombing. Precision bombing attacks are conducted with the idea that "it is better to cause a high degree of damage in a few really essential

industries rather than causing lesser damage in many industries".³⁰ But today's modern technology regarding pinpoint bombing has given a new dimension to precision bombing, that is, to simply paralyse the target and make it invalid for a short time instead of completely destroying it. On the other hand, the argument favouring general area bombing is that "there is no target or target set which is more vital than the other". General area bombing is based on the idea that it would cause a general level of destruction among all targets, and this would overwhelm the enemy's morale and war economy.³¹ However, generally precision bombing is mostly preferred and terror bombing which had been applied for night campaigns has also been decreasing because of the latest developments in night vision technologies.

Tactical air missions, on the other hand, imply air operations involving direct support to the ground and sea forces. In these operations, attack aircraft are generally employed in support of ground forces, especially against enemy tanks, transportation, supply lines and also supply installations in the combat area. Tactical air missions also includes protection of one's own forces from enemy air attacks, through interdiction, air surveillance and so on. Attack aviation is also employed in special operations against strategic points, which could be most effectively attacked by small fighter aircraft.

³⁰ John Gooch, (ed.), *Air Power: Theory and Practice*, (London, 1995) p.91

³¹ Ibid p.91

The independent air force which is the front line of national defence is not only a striking arm but also a shield.³² A nation could be protected from air invasion only by a strong or adequate air force, and the best form of aerial defence is the policy of aerial offensive defence. Gen. Mitchel strongly believed that only a strong air force could provide proper defence since the threat in the future was expected from the air. As the first and the foremost task of air power in a conflict is to safeguard its friendly forces, supporting installations, power centres, and its own self from enemy air attacks, obviously air defence emerges as a prerequisite for any air mission. According to Trenchard, the best means to safeguard one's coastlines and to attack the enemy trade was a shore-based aircraft supported by destroyers, submarines and minelayers. The air defence mission is supported by defensive aircraft and their ground operational facilities together with the nation's entire detection and warning complex and ground to air missiles and vehicle systems. Air defence is categorised into two different missions, one is active air defence and the other is passive air defence.

Active air defence implies direct action against the enemy's airborne offensive aircraft with surface to air missiles (SAMs), anti-air craft guns and fighter interceptors. The control and reporting systems also play an important role by acquiring speedy air warning about enemy aircraft movements and missiles, with the help of both ground based

³² Brig. Gen. P.R.C. Groves, "Our Future in the Air", in Eugene, M. Emme (ed.), n.3, p.177

and airborne radars like airborne early warning and control systems (AWACS), side looking airborne radars (SLAR), forward looking airborne infra-red radar (FLIR), identification friend or foe (IFF) systems and so on.

On the other hand, passive air defence aims at preventing casualties among civilian population, to maintain public morale and to ensure uninterrupted progress of industries especially those, which support the war machinery of the country. Passive air defence also includes operations like progressive evacuations, early warning, air raid sheltering and post raids emergency assistance programme.

Maritime air operations, as the name implies, aims at supporting naval forces to locate enemy vessels and submarines through reconnaissance sorties. It also includes operations like medium and low level bombing, torpedo bombing and mine laying operations and so on. With recent developments in the naval air forces, "aerial siege" may also be laid against any country. It could be very vital against insular powers, which are totally dependent on sea lanes and could "starve it in to submission in a short time".³³

Air transport operations aim at providing rapid movements of men, material and ammunitions to desired destinations. The nature of air operation could be either strategic, tactical or logistic based on the missions assigned.

³³ Gen. William Mitchell, "The Development of Air Power" in Eugene M.Emme (ed.), n.3, p. 172

In strategic operations heavy transport planes are used to cover long distances with heavy payloads. Since an airplane is swifter and faster than any other means of transportation, it is best suited for quick troop movements, in times of war. In tactical air operations, air transport is primarily carried out within the theatre, where the actual confrontation is going on. It involves operations like regular supply, airborne assaults, air landing operations, para-dropping and various similar assignments. The logistic air transport generally involves special missions like aero-medical casualty evacuation and other emergency operations. Basically, the main objective of air transport missions is to provide a nation with an instant retaliatory capacity, at short notice, in the event of a sudden and unexpected aggression.

Aerial reconnaissance is also one of the important mission of air power. Air power intelligence provides the fastest means of obtaining accurate and timely reports of enemy's movements which is vital in air warfare. Air surveillance is a regular process because it is essential to know about the day to day developments in the enemy military forces and military industry and also to identify enemy targets of long term interest. Special aircraft fitted with powerful cameras and electronic sensors are employed for these operations. At the tactical level, air surveillance concentrates mainly on enemy convoys, tanks, airfields, radar and communication centers. Air reconnaissance in fact

is the single most important source of reliable information, which is indispensable in air warfare.

The Persian Gulf War of 1990-1991 provides the best example of a great air war where all these aspects of air power can be closely examined. The Coalition air power projection of army, navy and airforce played a crucial role in the Gulf War and the dominance of air power was the war's decisive factor. Technology and sophisticated weapon system had an enormous effect in the conduct and outcome of the war. Many of the most advanced weapons like cruise missiles, anti ballistic missile defences, sophisticated stealth fighters, troop and supply helicopters, aircraft carriers, strategic bombers and strategic and tactical airlift were all used successfully for the first time in a major conflict. This war completely demolished the post-Vietnam War skepticism about the usefulness of air power. It also highlighted the potential and the necessity of air power in any forthcoming battle.

The Gulf War provides a clear insight of almost all aspects of air power. The variety of modern sophisticated aircraft deployed by the US led Coalition demonstrated the importance and ability of the components of air power, such as flexibility, mobility including range, speed and penetrative ability and firepower. It also displayed the latest developments of air power in achieving greater flexibility, mobility, penetrative ability, range, firepower, air refueling

capability and also demonstrated the various roles played by different aircraft. Most of the fighter planes deployed by the Coalition, particularly the F-117 stealth fighters were extremely flexible. These stealth fighters played an important role in deceiving and destroying the Iraqi air surveillance systems and air defence and anti-air craft system systems.

The Gulf War demonstrated the importance of penetrative ability of the aircraft and how it was enhanced by technology. During the Gulf War, the F-117A could easily pass across Iraqi border, with out being detected by the early warning and surveillance radar systems and conduct strike operations deep inside Iraq. This proved the promise of the stealth technology to aircraft survivability. Throughout the Gulf War the stealth aircraft were the only aircraft to fly above the intense air defence over Baghdad and conduct strike missions.

The recent development in the range of aircraft was also demonstrated in the Gulf War. The B-52G bombers of the US, which played an important role in attacking high value targets in Iraq during the Gulf War, also created a new record in aviation history, regarding the 'range' of the aircraft. These B-52G bombers which had flown a round trip combat mission to Iraq from Louisiana, had flown 14,000 miles at a stretch, with a flying time of 35 hours aboard, with the help

of in-flight refueling. This was the longest combat mission ever flown in terms of both distance and duration.³⁴

The Gulf War also demonstrated the recent development in 'fire power'. Precision technology played an important role in enhancing firepower. Precision technology increased the accuracy of the weapon to hit a target and destroy it in a fewer attacks. Precision drastically reducing the amount of firepower required to destroy a target. In the Gulf War, just with "less than half the tonnage of the bombs dropped on a single oil refinery, during the Second World War" the Coalition forces could destroy all the Iraqi oil refining facilities targeted for attack.³⁵ Precision technology also reduced the sorties required to hit a target and contributed to pilot safety. It also enabled the aircraft to operate strike missions at standoff ranges. Another achievement of Precision technology was that, it remarkably reduced the civilian casualties and collateral damages in the Gulf War. Precision weapons also allowed the Coalition forces to discriminate between disabling the targets and destroying them. The precision guided munitions used in the Gulf War included laser guided pave way bombs, Maverick missiles, the Hell Fires, the HARMS (Homing Anti-Radiation Missiles), the ALARMS (Air Launched Anti-Radar Missiles) the Patriots PAC-2 anti-missile missiles and the Tomahawk land attack missiles (TLAMS).

³⁴ Richard P. Hallion, *Storm Over Iraq, n.1*, p.174

³⁵ *Ibid.* p.192

The Gulf War also demonstrated the latest achievement in 'refueling capability'. During 'Operation Desert Shield', Coalition airforce tankers "flew 4,967 sorties totaling nearly 2000 flight hours, refueling 14,588 aircraft, off-loading 68.2 million gallons of fuel"³⁶.

This chapter provides the background and an understanding about air power. It gives a general idea about the evolution of air power and the various concepts of air power. It also provides an understanding about the roles of different aircraft in different missions. This chapter also highlights the achievements of air power, regarding range, penetrative ability and so on, during the Gulf War. This chapter also focuses on the strategies of air power propounded by various air power theoreticians. The relevance of these strategies will be discussed in the following chapter.

CHAPTER II

PLANNING THE AIR STRATEGY IN THE GULF WAR

The air campaign plan for 'Operation Desert Storm' in the Gulf War was clearly based on the four basic principles of air power theory, that is, 1) to gain and maintain air superiority, 2) to destroy the means of enemy production, 3) to maintain the battle with reinforcements and necessary supplies and without any interference by the enemy and 4) to prevent the enemy being able to maintain the battle by preventing him to build up adequate supplies for his army navy and his air forces. The air campaign plan for Operation Desert Storm was designed to attack and paralyse the critical Iraqi centres which enabled Iraq to hold Kuwait. The air campaign Plan aimed to paralyse Iraqi leadership command and deny any access between the Iraqi leadership and the armed forces. It also aimed at destroying Iraq's strategic offensive capabilities such as, Iraq's nuclear, biological and chemical weapons research, production and storage facilities, scud missiles and their stock sites, mobile and fixed scud missile launchers and so on, which posed a threat to the security and stability of the entire Persian Gulf. It also intended to conduct air interdiction attacks on transportation networks, communication links, supply dumps and similar targets, and reduce Iraq's ability to supply and reinforce its forces in Kuwait. The overall offensive planning of the air

strategy was based on principles of applying strength against weakness. In the initial stages of the war, many air power experts expected that this war could be won only with the air force and without the help of the ground forces. Though these objectives were never achieved, the use of precise strikes had led to the pursuit of specific military objectives such as disabling the targets rather than destroying them. The Gulf War strategy was also planned, with this concept as a main principle, in order to minimize the damage to Iraqi society. Apart from this, the strategy was also based on various other factors which would be discussed in this chapter

UN Security Council Resolutions and US Policy Objectives

Soon after the Iraqi invasion of Kuwait on 2 August 1990, the United Nations Security Council (UNSC) passed a resolution (Resolution 660) condemning the Iraqi Invasion and demanded the immediate withdrawal of the Iraqi forces From Kuwait.³⁷

By 5 August 1990, the United States declared its National Policy Objectives by a statement made by President. George Bush which included:

‘immediate, complete and unconditional withdrawal of all Iraqi forces from Kuwait, restoration of Kuwait’s legitimate government, security and stability of Saudi Arabia and the Persian Gulf and

³⁷ R.P. Anand, “United Nations and the Gulf Crisis”, *International Legal Monograph*, Series No:1, (New Delhi, 1994), p.9

safety and protection of the lives of Americans abroad.”³⁸

Following this from 2 August 1990 to 29 November 1990 about 11 resolutions (regarding the withdrawal of Iraqi forces from Kuwait and restoration of peace and stability in the Persian Gulf) were passed by the UNSC, but all in vain. On 29 November the UNSC passed a resolution (Resolution 678) which authorised the use of force for the implementation of resolution 660, if Iraq fails to comply with the UN demands, by 15 January 1991.³⁹ The UNSC decision to resort to force had two implications, one is restoration of peace and security in the Persian Gulf itself would obviously mean the elimination of the Iraqi military force, secondly even the removal of Iraqi forces from Kuwait would itself require a military operation.

Soon after the UNSC resolution to resort to force, a Coalition force of about 30 UN member countries including Afghanistan, Argentina, Australia, Bahrain, Bangladesh, Belgium, Czechoslovakia, Canada, Denmark, Egypt, France, Germany, Greece, Italy, Kuwait, Morocco, Niger, Netherlands, Norway, Oman, Pakistan, Poland, Portugal, Qatar, Saudi Arabia, Senegal, Syria, Spain, UAE and the United Kingdom,⁴⁰

³⁸ An Interim Report to the Congress Conduct of the Persian Gulf Conflict, Pursuant to title V Persian Gulf Conflict Supplement Authorization and Personal Benefits Act of 1991 (Public Law 102-25), July 1991. p. 1-1

³⁹ Ken Matthews, *The Gulf Conflict and International Relations*, (London, 1993) p.311

⁴⁰ Ibid p.315

which would be led by the United States was formed. These countries which also included some Arab and even some Warsaw Pact Countries voluntarily contributed to the Coalition in terms of ground forces, combat aircraft and naval forces. The Coalition air forces accumulated 1,820 combat aircraft with the US contribution of 1,376 fighters. Other non-US aircraft include 24 aircraft from Bahrain, 24 aircraft from Canada, 42 aircraft from France, 10 aircraft from Italy, 18 aircraft from Kuwait, 20 aircraft Oman, 12 aircraft from Qatar, 175 aircraft from Saudi Arabia, 50 aircraft from UAE and 63 aircraft from United Kingdom.⁴¹

By January 1991, President Bush was provided the authority to use the US armed forces pursuant to the UNSC resolutions, by a joint resolution passed by the US Congress, for the implementation of the UNSC resolutions. The central military objective of the Coalition, apart from the evacuation of the Iraqi forces from Kuwait, also included the comprehensive defeat of the Iraqi forces and the destruction of Iraqi land, air and sea forces. The objective behind the destruction of the Iraqi forces was twofold, one is to end up the war in a short time, by destroying Iraq's ability to sustain a long war and the second is to ultimately curb the threat by destroying Iraq's war making capacity and to maintain stability in the Persian Gulf.

⁴¹ Ibid p.313

The Iraqi Threat

Iraq, the fourth largest army in the world had a world class military force with over a million battle tested men, with about 5,700 tanks and 3,700 artillery pieces which included Soviet, Chinese and French tanks and armoured vehicles and Soviet, South African and Brazilian tube artillery⁴². Saddam Husein, who had decided to make Iraq a dominant regional power invested heavily in his military. In the year 1990 alone Iraq had spend \$ 12.9 billion on its military, an average of \$ 721 per Iraqi while the annual per capita income of Iraq was \$ 1.950.⁴³

The Iraqi Air Force (IQAF) comprised of 1,80,000 well trained air crew and 950 combat aircraft out of which 758 were fighter bombers/bombers, 15 bombers, 12 reconnaissance aircraft, 511 helicopters and 70 transport and 60 civil transport aircraft⁴⁴. The Iraqi combat air craft included 75 Mirage F-Is, 25 Su-24 Fencers, 41 MIG -25 Foxbats, 61 SU-25 Frogfoots, 123 MIG-23 Floggers and 208 MIG-21 Fish beds.⁴⁵ Iraq's air defence force had about 17,000 air defence personnel, 120 surface to air missile batteries and 7,600 anti- aircraft guns. Iraq also had a total of "16,000

⁴² Richard P. Hallion, *Store Over Iraq*, n.1, p. 127

⁴³ Ibid.

⁴⁴ Anthony H. Cordesman and Ahmed S. Hashim, *Iraq: Sanctions and beyond*, (Boulder, 1997) p. 264

⁴⁵ Ibid

radar guided and heat seeking surface to air missiles"⁴⁶, including heavier surface to air missiles such as SA-2s, SA-3s, and SA-6s. Iraq had constructed about "137-154 medium surface to air missile sites and 18 major surface to air missile sites in Iraq and 20-21 missile support facilities in Kuwait".⁴⁷ The Iraqi army also integrated 700 non-shoulder launched surface to air missile (SAM) launchers and 600 anti-aircraft artillery pieces (AAA) and nearly about 225 mobile Scud launchers. Iraq also possessed chemical and biological weapons and has also demonstrated its capacity to use such weapons on their scud missile.

After the Israeli 'Operation Babylon' Osirak raid in 1981, Iraq had reorganised its land based air defence system by establishing a network of radars, surface to air missiles and anti- aircraft guns in and around strategic industrial areas in Iraq. Iraq had constructed hardened underground facilities and placed its command and control facilities deep beneath the earth. Iraq had also developed a sophisticated ground and air defence system which incorporated a multi-layered automation linked detection and command and control systems. The Iraqis had set up a Soviet model kind of air defence system with the materials procured from France, a C³/BM system called KARI (Iraq spelled backwards in French). Iraq also possessed a number of "air defence weapons obtained from the French, Germans and the Soviets

⁴⁶ Ibid

⁴⁷ Ibid.p.275

which included SA-2, SA-3, SA-6 Kwadrats, SA-8 OSA, ZSU 23-4 Schulka, SA-13 (strella-1) and SA-14 (strealla-3) which were supported by Bar Lock, Slab Face, Squat Face, Thin Skin, Knife Rest, Spoon Rest, Fan Song, Fire Can, Land Roll, Land Blow, Straight Flush and Tall King acquisition radars, missile guidance radars and radar directed anti-aircraft artillery⁴⁸. The over all Iraqi land based defence system was integrated and placed under the control of National "Air Defence Operations Centre (ADOC)" which was "supported by five Sector Operation Centres (SOC) located in north, west, centre east, south east and far south of Iraq"⁴⁹. These sector operation centres controlled large number of ground based weapon systems and extensive C³/BM assets.

Iraq also had developed sophisticated communication systems with multi layered, built in back up systems. The important feature of this system is that, even if one layer is disrupted other layers would automatically take up the role of the disrupted layer. Though half of the military communication of Iraq was carried out by the civil telephone system, Iraq had also developed a micro wave system and a high capacity optic network which were buried and widely dispersed for making it difficult to trace and destroy.

The Iraqi forces had also constructed impressive road systems and supply depots, which were all inter connected

⁴⁸ Streetly Martin, "Twisting the Tiger's Tail", *Journal of the Electronic Defence*, September 1990, p.60

⁴⁹ Anthony H. Cordesman and Ahmed S. Hashim, n.44, p.274

and carried reinforcements and supplies to any point of the battle field. These roads which were multilane and many in number could not be totally destroyed. Supplies, which could last for a month without replenishment were also stored in Kuwait and southern part of Iraq. Most of this stockpile was dispersed to make targeting and destruction more difficult.

Regarding training, the Iraqi armed forces were well trained and well equipped, they were also well experienced in their eight years war with Iran. The Special Republican Guard forces, the strongest forces in the whole of Gulf region formed the core of the Iraqi army. The Iraqi air force personnel were also well experienced and skilled, "during the Iran-Iraq war they have conducted air strikes deep in to Iran at a range of 1,000 Kms through the use of extensive aerial refueling⁵⁰. But, still it appears that Iraqi air force did little offensive training and only rudimentary air defence/offence training during the months prior to the war probably "because of the strategy it intended to adopt or due to the fear that the US would be able to gather tactical and electronic intelligence"⁵¹.

The Iraqi strategy in the Gulf War was also designed based on its traditional defensive approach to war. The defensive strategy of Iraq had resulted from their own

⁵⁰ An Interim Report .p. 2-4

⁵¹ P. Singh, "Lessons Learnt During the Gulf War: Air War Aspect", *Strategic Analysis*, Vol.XIV, No:3June,1991,p.277

negative objective of prolonging the war instead of winning. The Iraqi strategy is not yet clear because it would be difficult to believe that Saddam would have ever thought about winning the war but he didn't want to lose it either. Saddam's intention was to fight a tactical level war and prolong it in to a war of attrition, which could be costly for the Coalition forces in terms of men, money, material and time, which in turn could force the Coalition forces to give up the war. Saddam also aimed at escalating the war involving Israel and shifting the focus on Arab-Israeli rivalry. So the objectives of Saddam Hussein regarding this was two fold one is to escalate the war involving Israel because this could have disturbed the Arab nations in the Coalition, the second one is to convert it in to a war of attrition.

Based on their defensive strategy, the Iraqis have established a formidable defence line with fire trenches and mine fields. The front line soldiers of the Iraqi army were backed up by the strongest Republican Guard forces who were mobile and able to sustain any frontal attack and prevent any Coalition penetration. The "fire trenches and the oil filled mine fields were constructed with coordinated interlocking fire from tanks, artillery and machine gun positions" and "equally strong positions were constructed along the sea coast incorporating naval and land mines"⁵².

Despite the numerical strength and deployment of the Iraqi forces, the Coalition also identified some key

disadvantages in the structure and formation of the Iraqi army, the Iraqi air defence system, the desert terrain and the Iraqi strategy. First, the rigid top-down nature of the Iraqi Military Command and the inability of the Iraqi forces to operate independently proved to be vulnerable to the Coalition forces. The Coalition planners found that if the political and military leadership is attacked and paralysed, they could not be able to direct the Iraqi forces. If the military leadership is separated from the ground forces there would not be any access of communication between them and the fielded forces will not be able to operate on their own, without support.

Secondly, the Coalition chose to attack selective targets of the Iraqi air defence system. The Iraqi air defence system was controlled by five sector operational centres which were integrated under the "Air Defence Operation Centre" in Baghdad. So, once these air defence control centres were attacked, the air defence mechanism could be easily suppressed.

Thirdly, the Coalition planners believed that the desert terrain could be very disadvantageous to the Iraqis because in such conditions the Iraqi ground forces and their logistic supplies would be clearly exposed to air attacks and more important it also would not allow the Iraqi forces to employ guerrilla strategy.

Fourthly, Iraq's generally defensive approach to war was thought to be more advantageous to the Coalition forces.

Iraq following the conventional wisdom that defence is the best form of strategy waited for the offensive, hoping to sustain the blow. But Saddam's calculations went wrong and Iraq was not able to sustain it.

Fifthly, the Coalition planners also identified that Iraq had never been exposed to situations like, sustaining offensive forces over great distances. This became an added advantage for the Coalition forces and allowed them to effectively use standoff range aircraft and cruise missiles.

In addition to these, the Coalition identified two Iraqi centres of gravity, the Strategic centre of gravity and the Theatre centre of gravity. The strategic centre of gravity involved the strategic and administrative high command in Baghdad and its ability to maintain the command and control of the Iraqi Forces. The theatre or operational centre of gravity involved various elements of the Iraqi forces particularly the Republican Guard forces.

These centres of gravity, the decisive sources of power also constituted crucial vulnerabilities. First, it was believed that destruction of Iraqi command and control facilities would itself could collapse the Iraqi infrastructure and bring down Iraq to comply with the UN demands. Secondly, it was believed that destruction of Iraq's NBC weapons capability itself would remove the major part of the threat to regional states, they included the destruction of Iraq's nuclear, biological and chemical weapons research, production and storage centres and also the delivery facilities. The

destruction of the various elements and the Republican Guard forces was expected to reduce Iraq's ability to conduct a coordinated defence during the war. It was also thought that Iraq would not be able to continue its occupation if the combat power of the Republican Guard forces deployed in Kuwait and southern Iraq is eliminated.

With these as the key objectives the US Central Command (US CENTCOM) was asked to plan a strategy for the Gulf War. During the Gulf War, the planning itself involved many aspects and the strategy was based on US experience over the conduct and failures of the previous wars fought by the United States.

The first important factor was the objective. This is particularly with reference to the Vietnam War. It was widely speculated during and even after Vietnam War, that the US objectives in the Vietnam War was not clear, and that even the policy makers were not sure what would constitute victory in Vietnam War. According to Gen. Harry Summers, "the lack of an objective in the Vietnam War" and "President Johnson's failure to articulate his objectives clearly" had a terrible impact on the US defeat in Vietnam War.⁵³ But in the Gulf War, the national policy objectives were clearly set out by the united states, that is, the comprehensive defeat of the Iraqi forces, evacuation of Iraqi army from Kuwait, liberation of Kuwait, security of Saudi Arabia, stability in the Persian

⁵³ Harry G. Summers Jr., *A Critical Analysis of the Gulf War*, (New York 1992) p.168

Gulf and the protection of the lives of Americans abroad, altogether constituted the overall objectives of the Gulf War.

The Second was the public support factor. During the Vietnam War, the US government did not bring the public attention to the war and deliberately “restrained from creating a war psychology in the US”⁵⁴ in order to limit the war. But later it was found that it was one of the major reasons for the defeat of the United States. But this factor was taken good care during the Persian Gulf War. The public sentiment and support were aroused in favour of the US lead Coalition and against Saddam Hussein.

The third factor was the utilisation of the reserve units. During the Vietnam War, the US government was very much hesitant to use the reserve forces, for some of the above mentioned reasons. The US government decided against such a move for the fear of antagonising the public sentiments, the local political situation also played a role in this. But during the Gulf War “tens of hundreds of reservists”⁵⁵ were recalled from the air force, navy and marine reserve forces for active service in both combat and support missions and about half of the forces deployed in the Gulf War were absorbed from the reserve units. In the United States it has become a fact that there could be no future wars without involving reserve units. Because after the Vietnam War, most of the US support operations forces were dispersed among the reserve units in

⁵⁴ Ibid. p.10

⁵⁵ Michael J. Mazzar and others, *Desert Storm*, n.2, p.51

order to involve them in wars. The performance of the reserve units in the Gulf War was also good.

The fourth factor was the training factor. In the post-Vietnam War years, the US had laid great emphasis on realist training. This involved exercise like flying with maximum load in different configurations, firing live armaments, operating with composite forces, simulation of enemy defences and targets, operating in electronic combat mission environment and so on. A few months prior to the Gulf War the US forces under went rigorous "training in realistic environment with 1400 realistic targets including replica Iraqi air-fields, scud Missile sites, Iraqi factories, research centres and tactical targets"⁵⁶. This gave the US forces the edge in the air operations in the Gulf War.

Taking in to account all other factors the US Central Command (USCENTCOM) devised a strategy that could be executed in three parts.

The first phase involved the destruction of the command and control and air defence facilities of the Iraqi military and administration by means of deep air interdiction. The second phase intended to achieve air superiority and bombard the Iraqi army in the Kuwaiti Theatre of Operations (KTO) and shatter the morale of the Iraqi forces and their will to resist. The third phase intended to incapacitate and defeat

⁵⁶ P. Singh, n.51, p. 276

the army in the Kuwaiti theatre of operations and liberate Kuwait from Iraqi occupation.

All these phases entailed the use of air power both strategic and tactical. To achieve the central military objectives, the Coalition air force had identified a set of selective targets which included the Iraqi leadership command facilities, electrical power production facilities powering military systems, airforces and air fields, known NBC Weapons research and production centres, scud missile production and storage facilities, naval forces and port facilities, oil refining and distributing facilities, rail roads and bridges connecting Iraqi military forces with their supply facilities, Iraqi military units including the Republican Guard forces and the Iraqi military storage sites the KTO.

Operation Desert Shield

During Operation Desert Shield the US military was directed to establish a defensive capability in the theatre. The objectives of 'Operation Desert Shield' were:

To deter further aggression by Iraq and to defend Saudi Arabia

To build and integrate the Coalition forces.

To achieve the command of the sea access to Iraq

To defeat any further Iraqi advances.

Accordingly, the overall strategy of Operation Desert Shield was based on rapidly deploying and employing forces to deter attack and if necessary to defend Saudi Arabia. The combined military objective of the US led Coalition aimed at establishing a defensive capability in the theatre, to respond to further Iraqi thrust and deter Iraq from continued aggression. The intent of the operation was to impose the maximum delay and disruption of the Iraqi advance, to inflict maximum number of casualties on their forces, to facilitate the improvement of the Coalition defensive capabilities and force the Iraqis to abandon their offensive operations.

Sanctions and Deployments

On 25 August 1990, following the UNSC resolution (Resolution 668) to use force to enforce trade sanctions against Iraq,⁵⁷ it was immediately pursued by the US and allied naval forces in the Persian Gulf and Red Sea. The maritime interception forces and Coalition air forces further tightened the economic sanctions through a naval and air embargo authorised by resolution 665 and resolution 670 of the UN Security Council.⁵⁸ At the same time these forces also ensured the continued flow of logistics to the Coalition forces.

During Operation Desert Shield the US air force deployed \$1 billion worth of fuel, ammunitions and other equipment. This included sufficient number of laser guided

⁵⁷ R.P. Anand, n. 37, p. 9

⁵⁸ Ibid.

GBU-10 and GBU-12 anti tank smart bombs, 2 million 30 mm cannon rounds for the A-10 warthogs, 20,000 cluster bombs and 45,000 MK-82, 500 dumb bombs⁵⁹.

The first major combat unit deployed by the US in the theatre was the 82nd air borne division, which was immediately followed by the 101st Air Assault, and the 24th Mechanised Division⁶⁰. By the second week of August, 24 F-15 Strike Eagles from the 71st Tactical fighter squadron and 24 tornadoes and Jaguars from the United Kingdom arrived at Saudi Arabia.

Airlift proved very critical to the desert shield deployment. The US C-5 and C-141 air-lifters had moved 5 fighter squadrons (120 fighters) and AWACS contingents and a brigade of the 82nd air borne division all within five days⁶¹. By the 3rd week of August, the US had deployed hundreds of strike and support aircraft including F-15 Cs, F-16 C/D, F-15 strike eagles, F-4 G Wild-Weasles F-117 A Stealth Fighters and A-10 warthogs. The support air craft included E-3A AWACS, RC-135 reconnaissance aircraft, KC-135 and KC-110 airborne tankers and C-130 tactical air-lifters.

Throughout the month of August 1990, the Coalition continued to build up its forces and infrastructure. Saddam's continued defiance resulted in the decision of the Arab league, on 10 August 1990 to send forces to Saudi

⁵⁹ Richard P. Hallion, n1, p.49

⁶⁰ Michael J. Mazarr and others, n.2, p49

⁶¹ Richard p. Hallion, n.1, p137

Arabia. The first contingent of the Arab forces of the Coalition to arrive at Saudi Arabia was the Egyptian troops which arrived on 11 August 1990. As military contingents from the members of the Coalition arrived, the range of options also broadened and the strategy from the reliance of air power shifted to a strategy of combined arms approach making use of all military power available.

While the sanctions and deployments of Operation Desert Shield continued the Coalition began to plan for air, land and sea offensive operations which the Coalition thought would be required for the future course of action, 'Operation Desert Storm'.

Operation Desert Storm

The key military objectives of Operation Desert Storm as stated in operation order (OPORD) 91-001 dated 17 January 1991⁶² were:

1. To attack the Iraqi political and military command and disrupt the command and control ,that is, to deny the Iraqi leadership the ability to communicate with its own forces and to control their deployment and operations.
2. To gain and maintain air superiority, so that it would facilitate bombardment of the Iraqi front line troops before the ground offensive started and also would

⁶² An Interim, n.38, p. 2-3

provide unhindered air support to the Coalition, once the ground offensive started.

3. To attack economic and industrial infrastructure targets, power stations, oil refineries and distributing facilities.
4. To sever Iraqi supply lines, that is to attack and destroy the bridges, roads and rail roads and deny the Iraqis the ability to supply and reinforce their troops in Kuwait.
5. To destroy the known chemical, biological and nuclear research, production and storage facilities and their delivery capabilities.
6. To destroy the Republican Guard forces in the Kuwaiti Theater of Operations and in southern Iraq.
7. To liberate Kuwait city from the clutches of Iraqi forces.

The Theater Campaign Plan

The Theater Campaign plan for Operation Desert Storm was a four phased operation. The first phase was a strategic phase which intended to destroy Iraq's integrated air defence, gain air superiority, interrupt Iraqi command and control and destroy Iraq's strategic offensive capabilities such as the chemical, biological and nuclear weapons production and storage centres and delivery capabilities, ballistic missiles and scud missiles. The second phase intended to suppress

air defences in the Kuwaiti theater of operations, to gain and maintain air superiority and to provide freedom of action for air attacks against Iraqi forces and the Republican Guard forces in K.T.O. The third phase focussed on the Iraqi ground forces, that is, to isolate the Iraqi army in KTO, by cutting it from its source of resupply and reinforcements and reduce it to a level that a ground campaign could be conducted with minimal casualties. The fourth phase intended to provide air support to the multinational ground forces.

The Air Campaign Plan

The Air campaign plan of Operation Desert Storm was based upon five important overarching objectives. They are (1) to isolate and incapacitate the Iraqi regime, (2) to gain and maintain air supremacy (3) to destroy known nuclear, chemical and biological warfare capability, (4) to eliminate Iraq's offensive military capability and (5) to render the Iraqi army in Kuwait ineffective.

The air campaign plan for "Operation Desert Storm" was drawn in the light of the classical theories of air power. The air campaign plan was clearly based on the four basic principles of the air power theory, that is, to gain and maintain air superiority, to destroy enemy's means of production, to maintain the battle with reinforcements and supplies and to deny the same to the enemy.

Besides, the air campaign also illustrated the importance of other aspects of air strategy, such as initiative

in air combat, deception of the enemy, dispersal of enemy air defences, exploitation by surprise and concentration of force.

In the early stages of the war, expecting the initiative from Saddam Hussien, the Coalition forces were preparing for a defensive strategy. But only at a later stage the Coalition planners could appreciate the impacts of initiating the war. The Gulf War clearly demonstrated the effect of initiation in air combat. As discussed in the first chapter, the initiative of the Coalition planners enabled the Coalition air forces to strike at a wide range of Iraqi targets and also to concentrate with maximum force.

Secondly with the help of the advanced aircraft like the F-117A stealth fighters and the sophisticated weapons like the precision guided smart bombs and Tomahawk cruise Missiles, the Gulf War planners could plan for deceptive operations deep into Iraq and remove the integrated Iraqi air defence and anti-aircraft weapons systems. These operations were based on the classical approaches such as, deception of the enemy and dispersal of his forces. The F-117A stealth fighters played an important role in deceiving the Iraqi radars and destroying its air defence forces. It should be noted that only after these stealth fighters destroyed the air defence system endangering the non-stealth aircraft, the other aircraft could fly and operate over Iraq. This illustrated the importance of dispersal of enemy air defences in air warfare.

Thirdly the Gulf War also illustrated the importance of exploitation by surprise. The mass of the Coalition aircraft, the lethality of their initial air strikes combined with stealth and other technologies achieved a high degree of surprise and paralysed the Iraqi regime cutting it off from its armed forces. This enabled the pursuit of early achievement of air superiority. The Coalition forces were also able to isolate the battlefield by interdicting enemy supply lines and degrading command and control lines. This demonstrated the implications of early achievement of air superiority.

Fourthly, another important aspect of air strategy, which prevailed in the Gulf War, was the selection of targets. The US led Coalition had chosen the Iraqi centres of gravity, the selective key strategic centres, which if attacked will lead to the collapse of the whole Iraqi structure. The Coalition pilots though they were restricted by some rules of engagement (ROE) like should not release weapon if the target is not clearly identified, otherwise were free to choose their own targets.

During the Gulf War, the Coalition forces preset a set of targets for each objective of the air campaign. This included command and control facilities, electricity production facilities, strategic air defence systems, radar sites, air fields and air forces, NBC weapons research, production and storage facilities, rail roads, bridges and the Iraqi Republican Guard forces and so on.

Targeting these strategic centres the air campaign plan aimed to paralyse Iraqi leadership command and deny any access between the Iraqi leadership and the armed forces. It also aimed at destroying Iraq's strategic offensive capabilities which posed a threat to the security and stability of the Persian Gulf.

As it was expected the achievement of air superiority itself was a difficult task. The Coalition had to encounter "700 Iraqi fighter air crafts and interceptors, 7,000 anti air craft guns, 7,000 radar guided missiles and 9,000 heat seeking missiles"⁶³. It had to suppress the surface to air missile (SAM) and anti aircraft artillery (AAA) sites, destroy Iraq's Franco-Soviet-British based air defence network, jam the early warning and air surveillance radars, command and control facilities and cut off the communication and computer links and the electrical power supply. Once this was achieved and the Iraqi combat power was brought to their favour, the air campaign strategy which was initially designed to be executed in three phases, shifted to a coordinated attack by the multinational ground forces and the Coalition air force, by merging together the three phases of the air campaign.

The Coalition campaign plan successfully exploited Iraq's weaknesses and its inability to gather tactical intelligence by destroying the command, control and

⁶³ Michael J. Mazarr and others, n.2, p.93

surveillance systems. The pursuance of the air strategy with the combination of massive air power and its precise application simultaneously against key Iraqi centres of gravity led to the rapid collapse of vital Iraqi military and supporting capabilities and paved way for a massive ground attack.

CHAPTER III

AIR OPERATIONS IN THE GULF WAR

As we have discussed in the previous chapter, the overall strategy of 'Operation Desert Storm' air campaign was based on achieving five strategic goals, that is, (1) to isolate the Iraqi leadership, (2) to gain and maintain air superiority, (3) to destroy the known Iraqi nuclear, chemical and biological (NBC) weapons capability, (4) to destroy Iraq's offensive and defensive military capabilities and (5) to render the Iraqi army in Kuwait ineffective. Accordingly, the air campaign plan was designed to paralyse Iraq's ability to maintain its occupation of Kuwait and liberate Kuwait from the clutches of Iraq. It aimed at destroying Iraq's war making potential, that is, to destroy Iraq's nuclear, biological and chemical (NBC) weapons research, production and storage facilities, scud missiles, and their stock sites, mobile and fixed scud missile launchers and render Iraqi forces ineffective as a fighting force.

Beginning with simultaneous air strikes, the Coalition air forces, attacked several key Iraqi targets. The highest priorities of the Coalition were to establish air supremacy over the Iraqi skies, by eliminating Iraq's integrated air defence system, by rendering enemy air forces ineffective and to prevent Iraqi use of chemical and biological weapons. Achieving air supremacy facilitated the conduct of continuous

air attacks with non-stealth aircraft against the complete range of targets. Stealth aircraft and cruise missiles allowed the Coalition to keep continuous pressure on Iraqi leadership as well as command and control nodes.

Technology and sophisticated weapon system had an enormous effect on the conduct and the outcome of the war. While some equipment, weapons and munitions deployed in the Gulf War had been already tested and combat proven, others like the F-117A stealth fighter and the Patriot anti-missile missiles were used for the first time.

The performance of the weapons system were also influenced by a number of factors including weather conditions, the nature of desert terrain, employment criteria (e.g., rules of engagement, to minimize collateral damage and so on), munitions capabilities and Iraqi capabilities and factors. For a variety of purposes air operations included F-117A stealth fighters F-16 C/D Fighting Falcons, F-15E strike eagles F-4G Wild-Weasel electronic warfare jammers, F-111Fs, FF IIIA Ravens, A-6E intruders, F-14 A+ Tomcats, F/A-18 A/C Hornets, British Jaguars, B-52G Stratafortress bombers, Patriot PAC-2 antimissile missiles, chemical warfare protection and Tomahawk land attack missiles (TLAMs).

The Air Campaign

Phase 1 of the air campaign started on the night of 16 January 1991, with simultaneous air strikes from the air and

sea based Coalition forces, targeting a wide range of high value Iraqi targets. Though the H-Hour was fixed to 3.00 AM 17 January, these attacks were conducted prior to the H-Hour in order to prepare for the strike plan to come together with time and sequence.

With the transmission of the air tasking order (ATO) via the airforce's computer aided force management system (CAFMS), the War started with simultaneous attacks on several key targets in Iraq. In fact, "air operations began at 6.36 AM on January 16, 1991 when the first seven of B-52G Stratofortress bombers of the Eighth Air Force left Barksdale air force base on a round-trip mission to Iraq"⁶⁴. These B-52G bombers equipped with AGM-86 ALCM (Air launched Cruise Missiles) Missiles, having flown continuously for 15 hours with the help of aerial refueling arrived at their launch points within fractions of a second of the planned time. These B-52G bombers along with the other B-52G bombers from Diego Garcia destroyed eight high value Iraqi targets, attacking with their cruise missiles. These bombers, once in every three hours repeatedly struck targets such as Iraqi communication networks and power generation and transmission facilities. They also conducted air interdiction operations and attacked many railroads, bridges and convoys, severing Iraqi re-supply lines and cutting off communication between Iraq and Kuwait.

⁶⁴

Richard P. Hallion, , n.1, p.163

Many events took place simultaneously beginning around midnight. A few hours before the H-hour, just behind the Iraqi border, "Few F-15 C strike Eagles which placed themselves under the guidance of three airborne warning control system (AWACS) aircraft cruised along three combat patrol tracks within the Iraqi radar range"⁶⁵, destroying the Scud launch installations in western Iraq. At around 2.20 AM, task force Normandy of the 101st Airborne Division, an army air force team constituting AH-64 Army Apache helicopters led by special operations. MH-35J Pave low helicopters sneaked unseen across the Iraqi border and attacked radars along the Iraqi border with Hell Fire Missiles and hydra unguided rockets. The destruction of these radars were important for the Coalition because these radars could have easily identified low flying aircraft particularly the F-15E strike Eagles fitted with LANTRIN (Low Altitude Navigation Targeting Infrared for Night) systems. More important, it could have alerted Baghdad that the hostilities had started. After destroying the radar sites these helicopters, dodging two heat seeking surface to air missiles (SAMs), returned to their bases.

Just minutes before the H-Hour "a single F-117A stealth fighter attacked and destroyed a hardened air defence operation centre in southern Iraq"⁶⁶. When H-Hour arrived 10 F-117A stealth fighters, quietly passed through the Iraqi

⁶⁵ Ibid. p.166

⁶⁶ Michael J. Mazzar and others, n.2, p.93-94

air space. Undetected by the Iraqi early warning and surveillance radars, the F-117As headed for the hardened defence sites endangering non-stealth attackers and command and control facilities. These F-117A fighters from the 415th Tactical Fighter Squadron, loaded with laser guided 2000 pound smart bombs attacked a host of targets including communication and command and control facilities, electrical power grid powering the command and control facilities and the military headquarters in Baghdad. One F-117A stealth aircraft cruised over the Iraqi Air Force Headquarters in Baghdad and blew it off with a smart bomb. Another F-117A fighter precisely hit a site in a "Baghdad suburb where the Iraqis were suspected to operate a Hawk missile battery, which they captured from Kuwait"⁶⁷.

Just minutes after the H-Hour a Tomahawk land attack Missile (TLAM) launched from a battle ship in the Red Sea attacked a target deep inside Iraq. This was followed by fifty-three other TALM missiles, targetting a variety of targets in and around Baghdad. Altogether, 106 Tomahawk missiles were fired on the first night. These sea launched TLAM missiles guided by "their gyroscopic inertial guidance system"⁶⁸, flew hundreds of miles across land and sea before it reached the target. These Tomahawk missiles, though it was not so precise as the smart bombs and also "lacked the

⁶⁷ Ibid. p.96

⁶⁸ Richard P. Hallion, n.2. p.171

ability to penetrate hardened targets⁶⁹, proved critical against other strategic targets. These TLAM strikes were followed by air launched AGM-86 cruise missile (ALCM) attacks launched from B-52G Stratofortress bombers. These cruise missile strikes along with the other air attacks struck and destroyed Iraqi communication facilities, ammunition storages, fuel supplies and all routes (including roads and rail roads) that led to Kuwait. The ALCM attacks were so precise that "out of 35 missiles launched on the first night 31 missiles precisely hit the targets with an accuracy rate of 89 percent"⁷⁰. These initial strikes enabled the Coalition to achieve strategic, operational and tactical surprise.

H-Hour

By the time H-Hour has arrived hundreds of Coalition aircraft under the guidance of four air borne early warning and control systems (AWACS) aircraft took to skies that would facilitate the air campaign according to its strike plan. Around 400 strike aircraft along with other Coalition support aircraft stormed into Iraq. These aircraft included EA-6B, EF-111A ravens and EC-130H Compass Call electronic warfare jammers, F-4G Wild-Weasels striking at Iraqi early warning and surveillance radars with HARM (Homing Anti-Radiation Missile) missiles, F/A-18s striking against Iraqi surface to air missile (SAM) launchers and missile sites, F-15E strike

⁶⁹ Ibid.

⁷⁰ Ibid. p.172

eagles, Tornados, F-111Fs and A-6E intruders striking at Iraqi air forces, air fields and scud missile sites, F-15C eagles and F-14A+ Tomcats striking at anti-aircraft artillery guns; F-16Cs Fighting Falcons, British and Saudi Jaguars and F/A-18 A/C Hornets suppressing the enemy air defences.

About the same time, elsewhere hundreds of special operations aircraft for strike, support and suppression missions took off from bases across Saudi Arabia and other allied Gulf Nations. These aircraft included F-111Fs fitted with pave low track sensor pods, F-15E strike eagles fitted with LANTRIN pods (Low Altitude Navigation and Targetting Infrared for Night) and A-16Es equipped with TRAM (Target Recognition Attack Multi-sensor systems; F/A-18As, AV-8Es, AH-1Ws and A-6E marine support mission aircraft and navy A-6Es, A-7Es. F/A-18A/Cs and A-6Es naval support operation aircraft.

These aircraft which targeted Iraq's early warning and surveillance radars, Iraqi air forces and air fields, Iraqi command and communication networks, Iraqi nuclear, biological and chemical (NBC) weapons facilities, scud missile launchers and missile sites, Iraqi navy and port facilities and Iraqi tanks and anti-aircraft artillery, were continuously supported by about "160 airborne tankers including American KC-10s, KC-135s, and KC-130s; British victors, Tristars and VC-10ks and Saudi KE-3Bs which flew multiple refueling tracks, staying out of range of Iraqi early warning

radars"⁷¹. The role played by the support aircraft particularly by tanker aircraft launched from the Coalition air force, navy and marine forces proved to be crucial because without the support of these airborne tankers many Coalition aircraft would not have been able to hit targets deep into Iraq. These support aircraft also enabled full exploitation of air supremacy by allowing the combat aircraft to extend operational missions in terms of both time and distance.

Beginning from day one of the air campaign, the B-52G Stratofortress bombers repeatedly attacked the Iraqi forces once in every three hours, destroying ammunition storage facilities and fuel supplies. Air interdiction attacks were also conducted and many rail-roads and bridges were subjected to attack by smart munitions dropped from F-117A strike aircraft, marine A-6E intruders, British Jaguars and Tornado GR-1 aircraft. These attacks were intended to sever Iraqi resupply lines and communications into Kuwait.

A fleet of 100 aircraft including F-16s, F-18s and Jaguars struck the Iraqi air defence positions and destroyed the surface to air missile sites and anti-aircraft artillery. American F-111s, F-15s and A-6Es and British and Saudi Tornados cruised over Iraqi airfields and repeatedly attacked them till they became ineffective. The "British tornados using their JP-233 munitions"⁷² played a crucial role in

⁷¹ Richard P. Hallion, n.1, p.165

⁷² Ibid. p.175

destroying the airfields and scud missile sites. The F-15E strike eagles were after the fixed and mobile Scud launchers striking at them and destroying them. The F-4G Wild-Weasels and F/A-18 Hornets also played an important role in eliminating the Iraqi air defence by destroying Iraqi surveillance radars with anti radar missiles. The American F-4G wild weasels used HARMs (Homing Anti-Radar Missiles) while the British F/A-18 Hornets used ALARMs (Air Launched Anti-Radar Missiles) to attack the Iraqi radars. As the strikes against the Iraqi surface to air missile (SAM) radars increased most of the Iraqi radars shut down or they "became extremely reluctant to emit long enough to employ their SAMs"⁷³. But the Coalition forces used 'drones' launched from air and ground sources which mimicked the radar signs of the incoming strike aircraft and once the radars started operating, the F-4G Wild-Weasels and British Tornados would launch HARM and ALARM missiles and destroy it. Staying out of the Iraqi radar range and safe from Iraqi anti aircraft artillery, the EA-6Bs and "EC-130H Compass Call electronic warfare jammers flying across the borders, jammed communications hindering the effectiveness of the already crumbling air defence system"⁷⁴.

During the first day of the air campaign there was hardly any resistance by the Iraqi air force except a few

⁷³ Price T. Bingham, "Rapidly stopping an Invasion", *Strategic Review*, vol.xxvi, No.4, Fall 1998, p.56

⁷⁴ Richard P. Hallion, n.1, p.172

interception by the Iraqi air force F-1, MIG-28 and MIG-29 aircraft. But after these aircraft have been shot down all the Iraqi combat aircraft hid themselves in their hardened bunkers, while the Iraqis responded only with their anti-aircraft artillery. The anti-aircraft artillery were also aimlessly firing in the air on a random basis. However, the Coalition forces lost ten aircraft to the anti-aircraft fire but this was very less compared to the pre-war estimation. Before the air campaign started the air campaign planners expected that the Coalition forces would loose around 200 aircraft on the very first day.

On the first day, "altogether 668 Coalition aircraft attacked Iraq, out of which 530 aircraft were from the air force, 90 aircraft from the marine corps, 24 aircraft were from Britain, 12 aircraft were from France and 12 aircraft were from Saudi Arabia"⁷⁵. All the operations of these aircraft except the naval air defence and the army and marine helicopter operations others were supported and coordinated by a single air tasking order. All the special operations force missions, cruise missile attacks and Army's ATACM missiles were also supported by the ATO.

Overall, the "Coalition had flown 1,300 combat sorties in the first twenty four hours"⁷⁶. This also included 535 sorties by air attacks and cruise missile attacks, on 31

⁷⁵ Ibid. p.166

⁷⁶ Ibid.

different known nuclear, biological and chemical weapons research, production and storage facilities. Other strikes shattered Iraqi communication and control centres, destroyed storage and maintenance facilities, destroyed Iraqi air forces and airfields and completely saturated the Iraqi air defence system.

The initial air strikes stunned the Iraqi political and military leadership and imposed a strategic paralysis on the Hussein regime. The application of simultaneous air strikes combined with technologies like precision, stealthy delivery systems and standoff range weapon systems devastated Iraqi command, control and communication facilities, power generation and transmission facilities, air defence operation centres, NBC weapon sites, and scud missile sites and so on. Overnight, the concentrated air attacks eliminated the integrated air defence system. This enabled the achievement of early air superiority which facilitated the operations of other non-stealth aircraft. With the first day's attack, the Coalition forces were able to achieve strategic operational and tactical surprise. The degree of surprise achieved and the early achievement of air superiority allowed the Coalition to combinedly attack strategic and tactical targets merging all the three phases of "Operation Desert Storm". With the success of the phase I of the air campaign, the focus of the Coalition forces shifted to achieve the remaining objectives.

Phase II operations of 'Operation Desert Storm', as it

was expected, was a limited operation of intensive and concentrated air attacks on Iraqi air defence facilities in the Kuwaiti Theatre of Operations (KTO). Phase II operations were scheduled to begin on the fourth day of the air campaign, since it was expected that phase I operations would take four days. But, with the achievement of air superiority and surprise, phase II operations started on the second day merging with phase I air attacks. During the phase II operations, the Coalition air forces encountered 35 Iraqi fixed wing aircraft, shot down all of them in air to air combat, without the loss of a single Coalition aircraft. The Coalition aircraft also struck and destroyed the surface to air missile (SAM) sites, airfields, and command and control facilities in the Kuwaiti Theatre of Operations. Because of mass of the Coalition aircraft and the lethality of their attacks, the Iraqi aircraft could not confront them in the air-to-air battle and to save themselves they had to hide in their hardened shelters. Later, the Coalition conducted concentrated "shelter bursting" air attacks on the hardened shelters destroying many of them along with some of the Iraqi aircraft. This resulted in the achievement of ultimate air superiority over Iraq and the Kuwaiti Theatre of Operations.

Phase III of Operation Desert Storm which was scheduled to begin on the fifth day of the air campaign started on the second day. The phase III of the air campaign was intended to focus on various elements of the Iraqi forces including the Republican Guard forces in southern Iraq and

the Iraqi forces in Kuwait. These attacks sought to reduce the Iraqi army and shift the correlation of forces more in favour of the Coalition, thereby reducing the casualties to Coalition ground forces during the ground assault.

During phase III operations, the Coalition air force, navy and marine fighter pilots targeted the Iraqi fielded military forces, in order to reduce their combat strength by destroying their command and control facilities and disrupting their communication and supply lines.

A fleet of variety aircraft including F-16s, A-10 arthogs, F-115F Aardvarks, F-15E strike eagles, British, French and Saudi Jaguars and Sky Hawks; Battle Management Systems like the E-8 JSTARS aircraft, each assigned with their own missions and in accordance with the air tasking order, were operating over Iraq and Kuwait.

Along with the other aircraft, the helicopter gun ships including the US Apache helicopters, British Lynx helicopters and the French army Gazelle helicopters also played an important role in striking against the Iraqi forces. These helicopters using precision guided bombs like the Hell fire missiles, TOW missiles and the wire guided MOT-2 missiles devastated the Iraqi forces. The US Apache helicopters alone destroyed around 50 Iraqi tanks.

As, the Iraqi forces, the Republican Guard forces, tanks, artillery command posts, command and control

facilities and the Iraq's stockpiles in Kuwait underwent repeated attacks, the Coalition aircraft also struck the entire transport infrastructure, including road system and rail roads, over which the Iraqis carried replenishments and resupplies. The F-15E strike eagles played a crucial role in destroying the roads and railroads systems. These F-15E strike eagles fitted with 'LANTRIN' pods, flying under miserable weather conditions repeatedly attacked the roads connecting Iraq and Kuwait, important bridges and convoys were completely devastated. The navy and marine aircraft also struck the roads along the Kuwait City to Basra and many other roads of strategic importance. These combined air attacks reduced the Iraqi forces to about fifty per cent and severely degraded their ability to conduct an effective defence, leaving the Iraqi forces completely demoralised.

One of the most difficult tasks faced by the Coalition, during phase III operations was the destruction of Iraqi tanks, anti-armours and artillery. The A-10 warthogs and the F-111F 'Aardvarks' equipped with pave low track targeting pods played a crucial role in destroying Iraqi tanks. These "A-10 warthogs firing around 4,800 Maverick missiles destroyed as many as 1000 tanks, 2000 other vehicles and 1200 artillery pieces and two helicopters"⁷⁷. The F-111F 'Aardvarks' equipped with pave low track targeting pods, targeted the tanks with their forward looking infrared radars (FLIR) and destroyed them with their 500 pound GBU-12 pave way laser

⁷⁷ Ibid. p.211

guided bombs. These F-111F aircraft had seven times higher armour destruction rate per sortie than the warthogs. Precision guided weapons like the AGM-65G maverick missiles and the GBU-12 laser guided pave way played an important role in the destruction of the Iraqi tanks.

Battle management systems and various overhead systems including the F-8 JSTARS (Joint surveillance target attack radar system) aircraft, the TR-1 and U-2R aircraft fitted with optical and electronic sensors played a crucial role in the air campaign. These battle management system played an important role in detecting the enemy formations and battle tanks and directing strikes from the Coalition aircraft.

Tactical airlift operations by the Coalition aircraft within the operational theatre proved critical to the phase III operations. The C-130 air-lifters of the Coalition forces played an important role in supplying air drops of food, water and ammunitions to the Coalition ground forces. These "C-130 airlifters also evacuated 600 wounded Iraqi prisoners and other war wounded and non-battle casualties"⁷⁸.

During the phase III operations the Coalition forces flew 35000 combat sorties including 5600 sorties against the Republican Guard forces. Over the entire campaign the Coalition had flown "109,896 sorties with an average of 2,555 sorties per day. Out of these 27000 sorties were used against scud missiles, Iraqi airfields, air defence facilities, electrical

⁷⁸ Ibid. p.233

power grids, known NBC weapons facilities, Iraqi intelligence assets, communication facilities, Iraqi military headquarters, Iraqi army and Iraqi oil refining facilities⁷⁹.

During the Gulf War, the initial air attacks on the Iraqi command and control, power generation and transmission facilities, transport infrastructure and the Iraqi forces proved to be the cutting edge of the air campaign.

The initial air attacks on the command and control facilities by the F-117As with their precision guided smart bombs and TLAM cruise missiles, struck forty-five key Iraqi targets. These targets included Iraqi early warning and surveillance radar, sector air defence operation centers, communication facilities and scud missile sites. These attacks, paralysing the Iraqi political and military leadership, separated Saddam Hussein from its military forces. This had a dramatic effect on the Iraqi military forces. Because of their rigid top-down military command, the military forces cut-off from their military leadership were confused and were operating on their own. The important feature of this was that the Coalition could do this without carpet-bombing. This illustrated the exploitation by surprise concept of the air-power theory.

Following this, the Coalition forces struck seven selective power generating and transmitting facilities, which had strategic implications. The air strikes included cruise

⁷⁹

Ibid. p.188

missile attacks and over 200 manned air craft sorties. Since electricity is one of the vital necessities and it could not be stockpiled, the power facilities once struck were completely shut down, leading to the collapse of the majority of Iraqi industries. If they had struck the industries as such, it could have consumed a lot of time, air power and a large scale bombing. Overall the Coalition achieved a passive destruction by stopping production in a number of industries. This illustrated the classical principal of destruction of enemy means of production in air warfare.

The attacks on the oil refineries and transmission facilities proved to be crucial to the Coalition forces. By this, the Coalition forces could stop the fuel supply to the Iraqi forces. Iraq, one of the largest exporters of petroleum producers, possessed advance petroleum extraction infrastructure. The Coalition air forces in order not to impose greater hardships on Iraq attacked only its oil refining facilities, sparing the crude oil production. With the help of precision guided munitions, the Coalition forces “destroyed all the oil refineries targeted with less than half the tonnage of weapons dropped on a single German oil refinery during the Second World War”⁸⁰. This demonstrated the achievement in the improvement in firepower technology, particularly, precision. This also illustrated the US commitment to disable Iraqi targets rather than destroying them.

⁸⁰ Ibid. p.192-193

In order to cut off the re-supplies into Kuwait, the Coalition also conducted air interdiction on the Iraqi transport infrastructure. These attacks on the Iraqi transport facilities proved critical for the success of the air campaign. The Coalition air interdiction destroyed 41 of the 55 key rail roads and bridges which were vital for the supply of Iraqi forces in Kuwait. These attacks also destroyed 32 temporary bridges hastily built by the Iraqis during the war. This resulted in the disruption of supplies and key communications between Iraq and Kuwait. These attacks demonstrated the significance and importance of disrupting the enemy's means of re-supplies and replenishments to the battlefield.

The attacks on the Iraqi air forces (IQAF) also proved to be crucial for the Coalition victory in the Gulf War. The mass of Coalition aircraft in the Iraqi air space and the lethality of the Coalition air attacks prevented the IQAF to confront in air-to-air combat or to support their ground forces. During the first week of the air campaign, the F-15 E strike eagles and British F-18 Hornets together shot down 30 Iraqi aircraft in air-to-air combat. This forced the IQAF either to hide in their hardened shelters or to fly to Iran. The Coalition forces in order to destroy the Iraqi aircraft in their shelters conducted active shelter-busting operations and struck the Iraqi aircraft shelters patterned on Warsaw-pact models, designed to withstand nuclear attacks. The Coalition airforces devastated as many as "375 out of 594 Iraqi shelters

and the aircraft within many of them"⁸¹. The Coalition air forces destroyed more than 200 Iraqi aircraft in their airfields. The important feature of this is that, the Coalition forces could achieve this with a remarkably low loss of Coalition aircraft. This proved the importance of destroying the aircraft on ground rather than in the air. Altogether the Coalition intercepted and destroyed 35 Iraqi aircraft in air-to-air confrontation.

The Weather Factor

The weather over Iraq during Operation Desert Storm was one of the most important factors which influenced the air operations and the effectiveness of the Coalition weapon system. During Operation Desert Storm, Iraq experienced its worst weather in fourteen years, which was twice as bad as the usual climate for that season, the weather problem proved to be very serious because the Coalition forces had imposed certain rules on themselves, which did not allow the Coalition aircraft to release the weapon unless and if the targets is clearly identified. These restrictions which was intended to minimize collateral damage to the Iraqi society very much affected the Coalition aircraft, particularly the F-117A Stealth fighters. The low cloud cover which was predicted to be "15 percent of the time actually dropped to 45 percent of the time"⁸².

⁸¹ Ibid. p.195

⁸² Mazzar J. Michael, and others, n.2, p.102

Weather seriously impacted the operations of F-117A stealth fighters in the first two weeks of the war. The bad weather "forced the Coalition forces to abandon attacks on 40 percent of the targets for the first ten days"⁸³. In the first three weeks, the accuracy of the precision guided smart bombs dropped by the F-117A stealth fighters were very much affected. However, the smart bomb accuracy which was 70-86 percent during the first three weeks gradually increased to 90 percent as the weather improved. In the end of the month as the weather became clear "the F-117A fighters achieved a 93 percent accuracy in a series of attacks against nuclear research facilities, ammunition storages, biological and chemical weapon sites and solid rocket propellant sites"⁸⁴.

The Scud Campaign

Another important task faced by the Coalition forces were the destruction of Scud missiles. The destruction of the scud missiles was important for the Coalition forces not because of the its military capability but more because of its political implications. Saddam Hussein, as he had announced earlier was trying to widen the conflict, drawing Israel in to the war by attacking Israeli targets with their scud Missiles.

The scud campaign which was intended to destroy scud

⁸³ Ibid.

⁸⁴ Richard P. Hallion, n. l, p. 177

missile sites, fixed scud missile launch installations and mobile scud launchers started on the first day of the air campaign, along with other phase I operations, the first attacks on scud missile sites started when a few F-15 E strike eagles struck a scud missile installation in Western Iraq.

The scud campaign based on intelligence regarding scud missile production, supply and storage facilities, involved a variety of air crafts for their operation, this included 'LANTRIN' equipped F-15E strike eagles striking at fixed scud launch installation, B-52G bombers attacking scud storage and production facilities, F-16 C/D and A-10 warthogs conducting road reconnaissance to detect the mobile scud launchers called the 'Transporter-Erector-Launcher' (TEL) and F-117A stealth aircraft striking at missile sites deep inside Iraq⁸⁵. The American and British special operation forces and the Army's ATACMs proved critical to the scud campaign, the early warning space systems played an important role in detecting the 'TEL' mobile scud launchers and provided early warning regarding the Scud missile launches.

Starting from the first day of the campaign, the Coalition forces repeatedly conducted concentrated attacks on the scud missile sites and degraded the scud missile production and destroyed their storage facilities. The F-16 C/D aircraft and the A-10 played a crucial role hunting for

⁸⁵

Ibid. p.181

the mobile launchers (TEL). They had a terrible impact on the TELs that most of them hid below the high way bridges and residential areas in order to escape attacks, the attacks on the scud launchers forced them to hide and operate in unprepared situations and also to launch their missiles while they are moving. This seriously affected the accuracy of the scud missiles. Though the Coalition air attacks could considerably reduced the frequency of the scud launches they could not fully suppress it.

Despite the attacks on the missile sites and missile launchers, the scud missiles which had been launched and closing towards their targets had to be intercepted in the air. This completely depended upon the Patriot pac-2 anti-missile missile's capability to intercept and destroy it in the air, though the scud missiles were militarily less significant, "the speed of some of the Scuds like the Al-Husayn with a speed of 5,300 mph at an altitude of 25 miles"⁸⁶, proved to be difficult for the Patriots to detect it at an early stage and encounter it at a distance. Since the scud missiles does not include any active guidance system, it could not be jammed or diverted. So the only option to the Coalition forces was to encounter it with the Patriot anti-missile missiles.

All the scud missiles launched against Israel and Saudi Arabia were monitored and detected by the Patriot radars, if the radars found that the scuds were about to hit a target

⁸⁶

Ibid. p. 184

within its range it would immediately launch the patriot missiles to intercept the scuds, otherwise the radars let it pass and explode out of range. To increase the effectiveness of the patriot missiles and to maximize their destructive capacity two patriot missiles were used to counter one incoming scud missiles.

Out of 93 Scud missiles launched by Iraq, which included 42 fired at Israel 48 at Saudi Arabia and 3 at Bahrain⁸⁷. Only a few scuds fell on their targets, causing minimum damage, others went astray and exploded in the ocean or the desert, while some of them were intercepted by the Patriot anti-missile batteries. The notable scud attack came when an unengaged missile hit a military barracks killing 28 American soldiers and wounding 97 others. Later, it was claimed that the scud missile slipped in when the patriot battery positioned to intercept it was down for computer maintenance. During the war, it was claimed that the Patriots had intercepted 48 scuds giving an engagement rate of 96 percent. But in the post war years. Many controversies broke out about the effectiveness of the patriot missiles. It was badly criticised that the missiles short-range interception actually increased the material damage, as the debris of the colliding patriot missile and the scud missile fell on Israeli cities. Doubts were also raised about the accuracy of the inter-war analysis of 96 percent of engagement rate.

⁸⁷ Ibid. p.185

The Role of Technology

High technology played an important role in the Gulf War and it had an enormous effect on the conduct and outcome of the war. High technology contributed to air power in many ways, such as Precision guided weapons, Stealthy delivery systems, suppression of enemy air defence system, Battle Management system and space based early warning and surveillance system and so on.

Precision was one of the most important contribution of technology. In the Gulf War, the precise nature of the weapons used enabled the Coalition forces to achieve strategic objectives by influencing maximum damage on the targets and minimizing collateral damage to the civilian population. Precision, drastically reducing the fire power required to hit a target also increased pilot safety by reducing the sorties required to hit the target. The high leverage of the precision guided weapons such as the laser guided smart bombs enabled the Coalition aircraft to operate from stand off ranges above the Iraqi artillery and infrared surface to air (SAM) missiles. Precision also allowed the Coalition forces to discriminate choice between disabling the target and destroying them.

The second important contribution of technology to air power was aircraft survivability. High technology helped aircraft survivability in three ways. They are 1) suppression of enemy Air defence system (SEAD), 2) stealth and 3,

unmanned Aerial Vehicles (UAV) or Remotely piloted vehicle (RPV)

The suppression of enemy air defence system, which played an important role in neutralising the Iraqi integrated air defence and weapon system and maximizing the potential of the friendly aircraft, also “contributed to aircraft survivability by allowing Coalition aircraft to fly safely at medium altitudes”⁸⁸. Coalition aircraft equipped with SEAD system, particularly the F-4 G Wild-Weasel played a crucial role in achieving air superiority over the Iraqi skies. The SEAD system increased the F-4G Wild-Weasels ability to quickly and autonomously detect locate and target surface to air (SAM) missile radars with high speed anti-radiation missiles (HARM). The “risk demonstrated by the SEAD equipped F-4 G wild weasels forcefully reduced the Iraqi SAM radar range and their ability to effectively use their surface to air missiles”⁸⁹. This added to aircraft survivability by removing the restrictions on the Coalition aircraft to operate from medium altitudes.

Another factor which contributed for aircraft survivability was stealth. Stealth allowed the aircraft to pass undetected by the early warning and surveillance radars. It also increased the penetrative ability of the aircraft to go and conduct strike operations deep in to Iraq above the dense air

⁸⁸ Price T. Bingham, “Rapidly Stopping an Invasion”, n., p.57

⁸⁹ Ibid.

defence and weapon system. Stealth also contributed to aircraft stability and maneuverability. Stealth fighter combined with precision munitions enabled the Coalition planners to go for a single strike across the entire Iraq, targeting a wide range of high value Iraqi targets.

Unmanned aerial vehicles or remotely piloted vehicles were one of the major contributions of technology to greater aircraft survivability and also to the modern conventional warfare. In the Gulf War, sea launched Tomahawk land attack missiles (TLAMS), which had a range of 700 miles played a crucial role in attacking the targets deep inside Iraq. The precise nature of these weapons and the freedom it offered from pilot safety made the cruise missiles extremely useful against high value, high risk targets. These cruise missiles provided the Coalition forces with an entirely new dimension in warfare capability.

Besides these, the Gulf War also presented the most important test of American weapons in 25 years. The war witnessed the test of a wide range of American weapons and space based warning and surveillance systems. This included aircraft such as the F-117-A stealth fighters, SEAD equipped F-4G wild weasels, Battle Management System like the AWACS (Airborne Early Warning Control System) and the JSTARS (Joint Surveillance Target Attack Radar System) which was under development stage, and 'LANTRIN' equipped F-15E strike eagles. It also included the test of variety of

weapons like the HARM (Homing Anti-Radiation Missile), the ALARM (Air launched Anti-Radar Missile) the TLAM Tomahawk land attack missile and the Patriot Pac-2 anti-missile missiles.

The F-117A was the ideal most fighter aircraft deployed in the Gulf War. It was the only aircraft which could fly over the intense air defence over Baghdad and only after these stealth fighters destroyed the key defence infrastructure, the non stealth aircraft could operate over the Iraqi skies, the stealth air craft also does not require the package of support aircraft to accomplish thier mission. During an air operation in the Gulf War, eight F-117A stealth fighters which were striking at sixteen different points could achieve the same without much risk, what was achieved by a package of sixty aircraft including thirty two F-16s, sixteen F-15s, Four EF-111 electronic warfare jammers and eight F-4G wild weasels.

The 'SEAD' equipped F-4 G wild weasels played an important role in destroying the Iraqi surface to air (SAM) radars which permitted the other Coalition aircraft to operate at lower attitudes. The two Battle Management systems deployed in the Gulf War, the E-3 AWACS and E-8A JSTARS proved crucial to the success of the air campaign the E-3 AWACS managed much of the air battle by providing early warning regarding the anti-aircraft missiles and scud missiles launches and real time data on the air situation. The E-8 JSTARS aircraft also played an important role in conducting

real time surveillance and attack management missions like, providing targeting information to the Coalition strike aircraft and ground stations, and directing attacks on targets by aircraft and missiles. F-15E strike Eagles equipped with "LANTRIN" pods played an important role in detecting the scud missile sites and mobile scud launchers and destroying them.

Among the weapons tested in the combat were the HARM (Homing Anti-Radiation Missile) missiles which used the radar's own emissions for its terminal guidance. The ALARM (Air launched Anti Radar Missile) missiles were also successful as the HARM Missiles. But, the ALARM had a different kind of approach, these ALARM missiles once launched, if it did not find a target, can roam about or hang around in a parachute looking for a target and once it located a target it destroyed it in a head-on collision. The TLAM cruise missiles demonstrated a revolution in warfare capability. The patriot PAC-2 anti-missile missiles played an important role in intercepting the scud missiles and destroying them in the air. Since the Patriot anti-missile missiles were the only means of countering the incoming scuds, it was very much relied upon by the Coalition forces. These anti-missile missiles which were claimed to have produced tremendous results later became very controversial regarding their effectiveness. However, these weapons, which were successfully tested in the Gulf War were the stars of the war.

CONCLUSION

The Gulf War undoubtedly, is one of the greatest air war which has ever been fought. The accomplishment of air power with precise air strikes and 'over the horizon' targeting cruise missiles has made the Gulf War much more distinct. As, we have discussed in the previous chapters, air power like any other technological innovation, was more dominated by its military use rather than its civilian use. The aircraft which was successfully deployed for reconnaissance purposes, because of its versatility obviously found its way into attack missions. The diverse uses of the aircraft widened the necessities and options of the air power shifting the role of aircraft from reconnaissance missions to strike operations. The flexibility and more important its independence over the sea and land forces made the aircraft a principal instrument of war. Air power had not only belied the land and sea power but it had also created a revolution in warfare by carrying the war deep into enemy territory. Over a period of time it also led to drastic changes in air power, starting with balloons to the modern strike aircraft and cruise missiles. This state of air power manifested during the Gulf War was an evolution over a long period of time, since its military inception.

"The Gulf War will be studied by generations of military students" writes Richard P. Hallion "for it confirmed the major transformation in the nature of warfare: the dominance

of air power”⁹⁰. It is quite true regarding many aspects of air power. The Gulf War demonstrated that air power could be delivered at the vital strategic centres even in the midst of sophisticated air defence systems. The achievement of air power during the Gulf War, regarding range, penetrative ability, flexibility and fire power through stealth and precision technologies had never ever been witnessed. The achievement in airborne refueling and airlift capability was also remarkable. It seemed that, air power alone could have won the war but for the only reason that war involves territory and it requires land forces to occupy them. The Gulf War has not only confirmed the transformation in the nature of war, it also witnessed a revolution in air warfare. One of the key achievement of air power in Gulf War is the long range cruise missiles. The cruise missiles deployed in the Gulf War created a new dimension within air warfare. The most important feature of the cruise missiles was the freedom it offered from pilot safety concerns. This reduced the risk to zero percent and increased the destruction of the targets to the maximum.

Besides, while one appreciates the developments in air power, it also necessitates to look at the negative implication of these developments. It is a matter of fact that the alarm raised by the fore-thinkers in the previous centuries, regarding the disaster that air power could cause, had come true, within less than a century of its military inception.

⁹⁰

Ibid. p.1

The long range missiles draws much attention among all other elements of air power which was deployed in the Gulf War. The growth and development of long range missiles as one of the key instruments of air power has several implications. First, there are quite a lot of chances to think that the cruise missiles with their drastic effect and without much risk would increase the tendency to choose war in case of a crisis. Secondly, these missiles which carry conventional warheads could always be replaced with a nuclear warhead. Thirdly, in the present day context of preemptive attack, if something happens and by mistake if a missile is launched it would lead to catastrophe. Fourthly because of the mistrust among nations, the possession of missiles by one country could easily destabilise the regional security and promote regional arms race. Fifthly, possession of missiles by rogue states could cause unnecessary tensions and would create instability and also increase the feeling of insecurity among the regional states. Sixthly, this would also increase a country's tendency to get itself defended by massive defence programs such as the NMD (US National Missile Defence) to intercept the missile and blow it in the air, but in turn there is also a possibility for a triggerment of a new arms race altogether, such as production of missiles with penetrative capability beyond these nuclear shields. finally, the competition for the edge over other's strategic forces could trigger a on going missile race.

As the military implications of the Gulf War has some positive aspects it also doesn't fail to have some negative ones. While one can boast that air power had at last reached its ideal application fulfilling the promises of Douhet, Trenchard and Mitchell it is quite worrisome that the forethoughts on air power has also come true.

SELECT BIBLIOGRAPHY

BOOKS

An interim report to the Congress on the *Conduct of the Persian Gulf Conflict*, pursuant to Title V Persian Gulf Conflict supplement authorization and personnel benefits act of 1991 (Public Law 102-25), July 1991.

Abdulghafour, Gazi Ibdevi, *The Tragedy: Iraq's Invasion of Kuwait*, New Delhi Lancers, 1995.

Anand R.P., *United Nations and Gulf Crisis*, International Legal Studies Monograph, series No.1, New Delhi, Banyan Publications, 1994.

Aspin, Les and Dickinson, William, *Defence for a New Era: Lessons of the Persian Gulf War*, Washington, New York and London, Brassey's, Inc, 1992.

Axelgard, Fredrick W., *A New Iraq? : The Gulf War and Implications for U.S. Policy*, New York, Connecticut and London, Praeger, 1988.

Boyne, Walter, *Beyond the Wild Blue*, New York, St. Martin's Press, 1997.

Brown, Ashley, *Modern Warfare from 1939 to The Present Day*, London, Orbis, 1985.

Cairncross, Alec, *Planning in Wartime: Aircraft Production in Britain, Germany and the USA*, New York, St. Martin's Press, 1991.

Carus, Seth. W., *Ballistic Missiles in the Third World: Threat and Response*, Westport, Conn.: Praeger Publishers, 1990.

Cohen, Elliot, *The Gulf War Air Power Survey*, Vol.I-VIII, Washington, Govt. Printing Office, 1993.

Cole, Leonard. A., *The Eleventh Plague*, New York, W.H. Freeman, 1997.

Colier, Basil, *A History of Air Power*, London, Widenfield and Nicolson, 1974.

Cordesman, Anthony H. and Hashim, Ahmed S, *Iraq: Sanctions and Beyond*, Boulder, Westview Press, 1997.

Coyne, James, P., *Air Power in the Gulf*, Washington, USAF Association, 1992.

Davis, Paul. K., *Deterring or Coercing Opponents in Crisis*, Santa Monica CA, Rand Corpn. 1990.

De La Billiere, Peter, *Storm Command*, London, Harper Collins Publications, 1992.

Eugene, Emme, M., (Ed.) *The Impact of Air Power*, New Delhi, English Books, 1997.

Freedman, Lawrence and Karsh, Efraim, *The Gulf Conflict 1990-91*, London, Faber and Faber, 1993.

Hallion, Richard, P., *Storm Over Iraq: Air Power and the Gulf War*, Washington and London, Smithsonian Institution Press, 1992.

Janz, Wes and Abrahamson, Vickie (Ed.), *Wars of the Words: The Gulf War Quote by Quote*, Minneapolis, Minn.: Bubbleheads Press, 1991.

Kennett, Lee, *A History of Strategic Bombing*, New York, Charles Scribner's Sons, 1982.

Khalil, Samir Al, *The Republic of Fear: The Politics of Modern Iraq*, Berkeley C.A., University of California Press, 1989.

Matthews, Ken, *The Gulf Conflict and International Relations*, London and New York, Routledge, 1993

Mazarr, Michael, Snider, Don M and Blackwell, James A.Jr., *Desert Storm*, Boulder, Westview Press, 1993.

Miller, Judith and Mylorie, Laurie, *Saddam Hussein: And the Crisis in the Gulf*, New York and Toronto, Times Books, Random House Inc., 1990.

Morris, Eric, *Weapons and Warfare of the Twentieth Century*, London, Octopus Books, 1976.

Murray, Williamson, *Air War in the Persian Gulf*, Baltimore MD, Nautical and Aviation Press, 1998.

Pagonis, William G. and Cruikshank, Jeffrey L., *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War*, Boston, Harvard Business School Press, 1992.

Paret, Peter, (Ed.), *Makers of Modern Strategy*, Oxford, Clarendon Press, 1986.

Parsons, Iain, (Ed.), *The Encyclopedia of Air Warfare*, London, Spring Books, 1977.

Rampal S.L., *Air War*, New Delhi, Tirumurti Publications, 1974.

Schofield, Richard, *Kuwait and Iraq: Historical Claims and Historical Disputes*, London, Royal Institute of International Affairs, 1991.

Schwarzkopf, Norman. H., *It Doesn't Take a Hero*, London, Bantam Press, 1992.

Shultz, Richard H. Jr. and Pfaltzgraff, Robert K. Jr., *The Future Air Power: In the Aftermath of the Gulf War*, Alabama, Air University Press, 1992.

Singh, Jasjit, *Air Power in Modern Warfare*, New Delhi, Lancer International, 1988.

Spaight, J.M., *The Beginning of Organised Air Power*, London, Longmans Green, 1927.

Summers, Harry G. Jr., *On strategy: The Vietnam War in Context*, Washington, US Govt. Printing Office, 1981.

Summers, Harry G. Jr., *On Strategy II: A Critical Analysis of the Gulf War*, New York, Dell, 1992.

Summers, Harry G. Jr., *The New World Strategy*, New York, Simon & Schuster, 1995.

Taylor, Munson, *History of Aviation*, London, New English Library, 1975.

Temple Wood, Viscount, *Empire of the Air: The Advent of the Air Age 1922-29*, London, St. James Place, 1957.

Timmerman, Kenneth, R., *The Death Lobby: How the West Armed Iraq*, Boston, New York and London, Houghton Mifflin, 1991.

Trainor, Bernard. E. and Gordon, Michael R., *The Generals War: The Inside Story of the Conflict in the Gulf War*, New York, Little Brown, 1995.

Watts, Barry, D. and Keaney, Thomas, *Gulf War Air Power Survey, vol.II: Effects and Effectiveness*, Washington D.C., Govt. Printing Office, 1993.

ARTICLES

Bakshi. G.D., "Gulf War Reassessed: Validation to the Cyber War Model", *Strategic Analysis*, vol.19, no.6, September, 1996, pp.901-20.

Bhatti, Maqbool Ahmed, "Aftermath of the 1991 Gulf War", *Regional Studies*, vol.9, no.4, Autumn 1991, pp.3-21.

Carus, Seth. W., "Missiles in the Third World: The 1991 Gulf War", *Orbis*, vol.35, no.12, Spring 1991, pp.253-258.

Chomsky, Noam, (Interview), "This Section is a Call for a Lawless World in Which the Powerful will Rule", *Frontline*, 15 January, 1999, pp.12-16.

Danreuther, Roland, "Gulf Conflict: A Political and Strategic Analysis", *Adelphi Papers*, no.264, Winter 1991-1992, pp.1-88.

Deva, Yeshwant, "Electronic Dedicated Platforms in the Gulf War Part 1: EW System", *Strategic Analysis*, vol.xv, no.11, January, 1993, pp.1021-1030.

Deva, Yeshwant, "Electronic Dedicated Platforms in the Gulf War Part II", *Strategic Analysis*, vol.xv, no.12, March 1993, pp.1157-74.

Dietl, Gulshan, "Iran in the Gulf: The Post-Khomeini Phase", *Strategic Analysis*, vol..xvi, no.6, September, 1993, pp.747-760.

Ehteshami, Anoushiravan, "Saddam in Search of Suez", *European Affairs*, vol.1, no.19, February-March,1991, pp.12-14.

Feuerwerger, Marvin, "Defence Against Missiles: Patriot Lessons", *Orbis*, vol.36, no.4, Fall 1992, pp.581-588.

Fowler, C.A., "EW Problem and Some Proposed Fixes", *Journal of Electronic Defence*, September, 1989, pp.38-40.

Fulgham, David. A., "EF-IIIs Jammed Radar to Open Air War Against Iraq", *Aviation Week and Space Technology*, 4 February, 1991, p.26.

Gaylen. L., "The F-4G Wild Weasel: A Key Counter Air Asset for the 1990s", *Journal of the Electronic Defence*, August, 1991, p.67.

Halliday, Dennis, "Sanctions Continue to Kill", *Frontline*, 15 January, 1999, pp.18-20.

Heller, Mark.A., "Coping with Missile Proliferation in the Middle East", *Orbis*, vol.35, no.1, Winter 1991, pp.15-28.

Horner, Lt. Gen. Charles. A., USAF, " The Air Campaign", *Military Review*, September, 1991, p.27.

Kanovsky, Eliyahu, "Why the Oil Crisis Won't Last", *Orbis*, vol.5, no.1, Winter 1991, pp.79-92.

Kaul, Kapil, "The Stark Episode: US Capabilities and Intentions in the Gulf", *Strategic Analysis*, vol.xi, no.5, August, 1987, pp.547-557.

Krishnaswami, Sridhar, "Battles at Home", *Frontline*, 15 January, 1999, pp.10-11.

Kumarsamy, P.R., "The Arabian Interpretation of Operation Desert Storm: An Analysis of Saudi Military Communiques", *Strategic Analysis*, vol.xiv, no.3, June, 1991, pp.321-335.

Mahapatra, Chintamani, "Clinton's Operation Desert Strike", *Strategic Analysis*, vol.xix, no.9, December 1996, pp.303-20.

Mason. R.A., "Air War in the Gulf", *Strategic Analysis*, vol.xiv, no.10, January 1992, pp.1147-66.

Menon, Kesava, "Ways of Imperialism", *Frontline*, 15 January, 1999, pp.4-9.

Mullick, Hussein, M.A., "Iraq Kuwait Conflict and the Development Scenario to the Peninsula Arab Countries", *Pakistan Development Review*, vol.30, no.4, Winter 1991, pp.995-1001.

Munro, Neil, "C³ Countermeasures Aid Swift Defeat of Iraqi Military", *Defence News*, 11 April, 1991, p.48.

Nixon, Richard, "War about Peace: America's Massive Deployment to the Gulf is Morally Justifiable and Necessary", *European Affaris*, vol.1, no.91, February-March 1991, pp.6-11.

Pasha, A.K., "India's West Asia Policy: Continuity and Change", *Strategic Analysis*, vol.xvi, no.6, September, 1991, pp.783-802.

Rajan, M. K. and Shrivastava, B.K., "United States and Iraq", *Mainstream*, March 28, 1998, pp.19-20.

Rubin, Uzi, "How Much does it Matters?", *Orbis*, vol.35, no.1, Winter 1991, pp.29-40.

Sahai, Subodhkant and Ahmed, Ishtiaque, "Can US Destroy Iraq?" *The Third World Impact*, March 1997, pp.13-14.

Sajedi, Amir, "Iran's Relations with Saudi Arabia", *Strategic Analysis*, vol.xvi, no.6, September, 1993, pp.761-780.

Singh P., "Lessons Learnt during the Gulf War: Air War Aspects", *Strategic Analysis*, vol.xiv, no.3, June, 1991, pp.273-85.

Singh, Jasjit, "The Operational Environment of the Future", *Strategic Analysis*, vol.xi, no.5, August, 1987, pp.525-545.

Singh. K.R., "High Tech War", *World Focus*, vol.14, no.2-5, April-May 1991, pp.31-34.

Spector, Leonard. S., "Nuclear Proliferation in the Middle East", *Orbis*, vol.36, no.2, Spring 1992, pp.181-198.

Streetly, Martin, "Twisting the Tiger's Tail", *Journal of the Electronic Defence*, September, 1990, pp.60-62.